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Why Belonging Matters for College Students' Academic Engagement:

Antecedents and Consequences of Sense of Classroom Belonging

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by

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Dedication

I dedicate this dissertation to my husband, Seunghwan, who has always believed in me and stood strong by my side throughout my graduate school journey. I also dedicate my dissertation to my parents, for it is their true love and endless support that enabled me to pursue and earn a Ph.D.

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Why Belonging Matters for College Students' Academic Engagement:

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by

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The purpose of this dissertation project was to explore the mechanisms through which sense of belonging affects academic engagement—behavioral, emotional, and cognitive—over time in varying college classroom situations. The study also examined the potential contribution of some course attributes to either facilitating or thwarting students' sense of belonging on academic engagement. Moreover, this project sought to identify group differences between ethnic or racial minority students and non-minority students in terms of the effect of sense of belonging on academic engagement. Using structural equation modeling (SEM), the study tested a short-term longitudinal model that hypothesized the predictive relations among course attributes, sense of classroom belonging, and academic engagement at the beginning and toward the end of the semester. Participants were 295 undergraduate students from a public university in a southwestern state of the U.S., who were recruited via an online website dedicated to a subject pool that

was offered through the department of Educational Psychology. Participants were asked to respond to online survey items in relation to one of their undergraduate courses, choosing from those courses they were taking in the current semester the course that had a subject pool requirement. Results from the study showed that participants' sense of belonging in the classroom positively predicted academic engagement later in the semester, even after their motivation and course attributes were held constant. The results also indicated that mode of instruction and classroom goal structure had significant direct effects on participants' perceived belongingness at the beginning of the semester and subsequently indirect effects on their course engagement over the semester. Finally, the multigroup SEM analysis revealed that the effect of sense of belonging was almost equally beneficial for ethnic or racial minority and non-minority groups, suggesting that sense of belonging generally matters for both groups. However, a more nuanced look at the data suggests that for the ethnic or racial minority group, it may be more important to nurture a supportive classroom climate and provide ample opportunities to connect with peers. Overall, results provide insights into the powerful impact of sense of belonging in college students' engagement in the classroom.

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Chapter 1: Introduction

Researchers in recent years have paid attention to the socio-cognitive aspects of learning in school and classroom contexts. Research from this perspective has focused on how learners construct knowledge with others through the process of interaction and negotiation, and thus has emphasized the close association between social relations and knowledge creation in a learning community (Martin & Dowson, 2009; Watkins, 2005). Emphasizing motivational factors within such a paradigm, some researchers have argued that students' levels of engagement with learning tasks could be affected by their perceived support from their teachers and peer students, as well as from their surrounding learning environments (Martin & Dowson, 2009; Roorda, Koomen, Spilt, & Oort, 2011). Specifically, some research has examined the relations between student learning processes and the notion of *sense of belonging*, which generally refers to the extent to which individuals feel accepted or valued by the classroom or school community (Anderman & Freeman, 2004; Osterman, 2000). In this study, I join the line of inquiry on why students' sense of belonging to their learning community would matter in their learning journey.

RESEARCH BACKGROUND

Establishing social bonds and feeling accepted and valued by others in social situations is essential for every individual's life. Indeed, a need to belong has been conceptualized as a basic human desire to form and maintain at least a minimum number of positive and significant interpersonal relationships (Baumeister & Leary, 1995).

According to self-determination theory (Deci & Ryan, 2002; Ryan & Deci, 2000), the need for relatedness, or belonging, is considered one of the fundamental human needs for optimal growth and functioning, along with the need for autonomy and competence. The theory posits that individuals' need for belonging can be met through warmth, support, and care from significant others. Research has shown that in general feeling a sense of belonging and connectedness to others in daily life, either at work or at school, can facilitate psychological adjustment and intrinsic motivation (Deci & Ryan, 2002).

Bringing this theoretical concept to educational contexts, researchers have proposed the self-system model of motivational development (Connell & Wellborn, 1991; Skinner, Furrer, Marchand, & Kindermann, 2008), which argues that supportive learning contexts positively shape learners' self-perceptions and motivation (i.e., feeling greater sense of autonomy, competence, and relatedness), which in turn can enhance their engagement and achievement. However, compared to the autonomy and competence needs, relatively little research has been conducted on the need for belonging and student motivation, which calls for further empirical examination of how students' sense of belonging can be shaped by contextual factors (e.g., teacher, peers, classroom climate) and can influence their engagement with learning (Martin & Dowson, 2009; Skinner et al., 2008).

As hypothesized in the self-system model, previous research has so far provided ample evidence supporting a close link between students' perceived belongingness in their learning community and their motivational approach to learning. For example, feeling a sense of belonging in school or in individual classes has been found to predict positively

students' self-efficacy (i.e., expectancy for success), task value, and intrinsic motivation, even after controlling for a set of confounding factors such as gender and GPA (Anderman & Freeman, 2004; Goodenow & Grady, 1993). Research has also shown that students who feel a sense of connectedness to and relatedness with their teacher and classmates are likely to show interest in learning, persist in the face of challenge, and use various cognitive strategies (Furrer & Skinner, 2003; Martin & Dowson, 2009; Walker & Greene, 2009). Overall, findings from prior research have indicated that the more students feel that they belong in their school or classroom settings, the greater they become motivated and engaged in their learning processes.

In previous literature, academic engagement has been viewed as one of the important learning outcome variables that can be predicted by student sense of belonging (Furrer & Skinner, 2003; Osterman, 2000; Zumbrunn, McKim, Buhs, & Hawley, 2014). The concept of *academic engagement* is generally defined as active participation in learning activities and is known as a multidimensional construct that consists of three components: behavioral, emotional, and cognitive (Appleton, Christenson, & Furlong, 2008; Fredricks, Blumenfeld, & Paris, 2004). Research has consistently shown that academic engagement contributes to a great extent to students' learning as measured by grades, long-term academic achievement, school retention, and eventual completion of school. However, it has been widely noted that students' intrinsic academic motivation and their engagement decline significantly over time from their elementary to high school years (Cuseo, 2007). Accordingly, researchers have expressed with some urgency the need to understand and address this worrisome trend of declining student engagement (Lepper,

Corpus, & Iyengar, 2005; Marks, 2000). This study aimed to provide useful insights into academic engagement by examining the relations between sense of belonging and various aspects of engagement in classroom settings.

Despite the growing evidence of the importance of nurturing a sense of belonging in all educational contexts, extant research has heavily focused on elementary and secondary education settings (Freeman, Anderman, & Jensen, 2007; Zumbrunn et al., 2014). In American culture, university or college students, who are typically in the stage of transitioning to adulthood, are expected to be independent, responsible, and autonomous (Arnett, 1998). However, emerging evidence continues to show that cultivating a sense of belonging on campus can actually be crucial and beneficial to young adult students. Moreover, sense of belonging has become an important issue in higher education because many university students are enrolled in large institutions in which they may lack opportunities to interact with faculty and participate in classroom learning (Griffin & Hurtado, 2011).

Indeed, college students' sense of belonging, or feeling as if they matter and fit in the campus community, has been considered an essential factor that can predict their academic engagement and success (Pascarella & Terenzini, 2005; Strayhorn, 2012). Previous studies have found that college students who report a higher sense of school belonging tend to demonstrate greater effort and interest in learning tasks and tend to show stronger persistence and intention to complete the degree (Freeman et al., 2007; Hausmann, Schofield, & Woods, 2007). In other words, students who feel themselves as isolated or alienated are likely to become less involved in academic activities and even drop out of

college. An emerging body of research has applied these ideas to a more micro-level of analysis and has revealed that college students' sense of belonging to a specific classroom can positively predict their course-related motivation and engagement (Freeman et al., 2007; Zumbrunn et al., 2014).

The inquiry into students' sense of belonging at the classroom level is nascent, and more research is needed. That is, previous research has disproportionately paid attention to outcomes of sense of belonging at the entire campus level, while overlooking its implications within the classroom (Zumbrunn et al., 2014; Wilson et al., 2015). The latter is particularly important, and should be further investigated, as the classroom is at the center of academic experiences (Booker, 2007; Freeman et al., 2007). A recent study comparing the two levels of analysis showed that the link between perceived belonging and academic motivation was stronger and more salient at the class level than at the university level (Wilson et al., 2015), providing an empirical basis for more investigation of classroom level sense of belonging. In sum, more research is needed to uncover the mechanism that underlies the effect of college students' sense of belonging to their learning community on their academic motivation and engagement in higher education settings. The present study aimed to address this gap by extending the research scope to students at university-level institutions, who are learning particular course subjects in classroom settings.

Although previous research has consistently indicated a positive link between students' sense of belonging and their academic engagement in college classrooms, research on sense of classroom belonging still remains underdeveloped regarding its

connections to contextual environments and psychological learning processes such as engagement. That is, there is scant empirical research that has examined attributes of a particular course as antecedents of students' sense of classroom belonging. As one example, a large class size has been considered a barrier to students' sense of belonging and classroom engagement. Finn, Pannozzo, and Achilles (2003) suggested that sense of belonging can be one mechanism to explain the relation between class size and student behavioral engagement with learning. By contrast, Sidelinger and Booth-Butterfield (2010) found that feeling that one belongs and is connected to peers could mitigate the negative effect of a large class size and enhance a student's active involvement in the course. Besides class size, research has shown that traditional lecture style instruction may decrease students' sense of connectedness to their teacher and classmates, which would subsequently undermine student classroom participation (Kim, Park, Huynh, & Schermann, 2017). Researchers have also suggested that large classes along with reliance on lecture-based instruction may diminish to a great extent college students' classroom participation (Cuseo, 2007; Light, 2001).

Another key aspect of course environments that has received attention from motivation researchers is the notion of classroom goal structures. Based on achievement goal theory, *classroom goal structure* refers to teachers' orientations toward mastery or performance goals in their instruction strategies and evaluation practices in the classroom (Ames & Archer, 1988; Meece, Anderman, & Anderman, 2006). That is, teachers who create mastery goal structures generally focus on developing skills, making progress, and enjoying learning itself; whereas those who create performance goal structures emphasize

getting good grades, comparing students' test scores, and competition. Research in K-12 settings has consistently shown that students' sense of belonging and engagement were positively associated with classrooms adopting mastery-oriented goal structures and negatively associated with classrooms pursuing performance-oriented goal structures (Meece et al., 2006; Walker & Greene, 2009). Yet, there is a lack of empirical evidence about whether such associations would still hold for young adult learner classroom groups in post-secondary educational settings (Anderman & Freeman, 2004).

Overall, as evidenced in existing studies, it is still inconclusive to what extent sense of belonging can explain college students' engagement with learning in classroom settings. Additionally, previous studies have provided limited findings regarding how much the relation between sense of classroom belonging and academic engagement can be influenced by various attributes of college courses such as class size, instruction style, and classroom goal structure. Therefore, the primary goal of the current study was to overcome such limitations of prior research by disentangling intricate relations among sense of belonging, academic engagement, and course attributes. Specifically, I sought to test a set of hypotheses that suggested that course attributes would predict students' perceived sense of belonging, which subsequently (i.e., indirectly) would predict their levels of academic engagement in college classroom settings.

METHODOLOGICAL ISSUES AND CHALLENGES

The present study addressed some of the important methodological issues and challenges that have been identified from previous research. First, there is still a lack of

agreement on how to operationalize the concept of sense of classroom belonging. Second, sense of belonging in the college classroom has been typically measured on a single course subject at a single time point, raising questions about how students' perceived belongingness and engagement would interact across different courses and over time. Third, previous studies have shown inconsistent findings in terms of whether sense of belonging would have an equally influential impact on academic engagement for different student populations. These observations about prior research led to the development of specific research questions and determination of the appropriate statistical approach to data analysis for this study.

With regards to the measurement of students' sense of belonging in the classroom context, researchers have used varying instruments. Some researchers have emphasized social support from or relatedness to both teacher and peers as key aspects of perceived belongingness to the classroom community (Furrer & Skinner, 2003; Goodenow, 1993). Others have stressed the supportive student-to-student communication behaviors that promote active participation and interaction in classrooms (Booker, 2007; Dwyer et al., 2004). Yet, another group of researchers has proposed a general feeling of fitting in or of psychological membership in the classroom (Strayhorn, 2012). Taken together, prior research suggests a need to test whether it is possible to estimate students' overall sense of belonging as a latent variable by measuring the aforementioned sources. In response to the fragmented use of measurement scales and instruments in current research on sense of classroom belonging, I used a structural equation modeling approach to evaluate the extent to which the different measures could load onto a general sense of classroom belonging.

Another methodological issue in previous research is a lack of consideration of the malleable nature of the sense of belonging construct. Researchers have suggested that sense of belonging can either increase or decrease as circumstances change, and therefore feelings of belonging need to be supported on a continual basis (Strayhorn, 2012). For example, Hausmann et al. (2007) found that sense of campus belonging among first-year college students was positively associated with institutional commitment and intentions to persist at the start of the academic year but was unrelated to changes over time. They suggested that sense of belonging may not contribute to the development of commitment or intentions over the course of the first year of college. However, most prior studies were limited to single time point measurement of sense of belonging, which might not have fully captured this construct's dynamic characteristic. Moreover, to my best knowledge, no research has yet investigated the changes in the relation between sense of belonging and academic motivation or engagement both over time and across different courses, specifically in the college classroom context. Taking into account such limitations, I focused on assessing how college students' perceived classroom belonging in different types of courses influenced changes in their academic engagement from the beginning to the end of a semester, using a longitudinal research design.

Additionally, higher education researchers have argued that sense of belonging may be more crucial to certain student populations such as ethnic minority students, or those who are prone to feeling marginalized (Strayhorn, 2015). Booker (2007) pointed out that students of color tend to perceive markedly lower classroom belongingness in college, and therefore experience a stronger need for support and care from the classroom community.

Gummadam, Pittman, and Ioffe (2016) also showed that sense of belonging was positively related to the psychological adjustment of ethnic minority college students, even after controlling for their feeling of belonging to their own ethnic group (i.e., ethnic identity).

Other researchers have also observed a relatively lower sense of belonging among first-year college students transitioning from high school to college, and suggested that a connected learning environment that provides feelings of personal validation and promotes interactive learning can be especially beneficial for the freshman population (Hoffman, Richmond, Morrow, & Salomone, 2002; MacGregor, Cooper, Smith, & Robinson, 2000). However, when comparing African American and White first-year college students, Hausmann et al. (2007) found that students' sense of belonging predicted their intentions to persist and complete the degree regardless of their ethnic background. Yet, further research is warranted to examine whether being a freshman or being an ethnic minority could yield a significant difference in the strength or direction of the relation between sense of belonging and engagement. In this study, I sought to examine whether such demographic variables served as significant moderators in a model of sense of classroom belonging in which course attributes and academic engagement served as its antecedents and consequences respectively.

The next chapter will provide an in-depth review of theories and research findings about student sense of belonging and academic engagement, the two main constructs that were examined. In this integrative literature review, I will offer relevant theoretical frameworks and conceptual and operational definitions of each construct. Also, the literature review places a particular emphasis on identifying primary sources of classroom

belonging and evidence of interrelations among the two constructs based on previous research findings. In the third chapter, the method and results of a pilot study, which was conducted primarily to validate the proposed measures, are described. The fourth chapter presents the main study for my dissertation project, proposing a specific theoretical model and research questions, explaining the corresponding research design and method in detail, and reporting the results of the study. Finally, the fifth chapter focuses on a discussion of the results from the main study and providing implications for future research as well as for college instruction practices.

Chapter 2: Literature Review

In this chapter, I review the existing literature, both empirical and theoretical, relevant to an understanding of the two primary constructs relevant to this research. I begin with the construct of sense of belonging, then address academic engagement, and finish with work that has connected these two constructs. Additionally, I integrate in the last section of this review a critique of the existing literature with a focus on identifying gaps that informed the research questions and design of my research.

STUDENT SENSE OF BELONGING

Theories and Conceptions of the Construct of Sense of Belonging

A sense of belonging has been considered one of the essential psychological needs in one's daily life. Maslow (1970) viewed belongingness needs as a type of deprivation needs that motivate individuals to seek fulfilling them whenever there is a lack of satisfaction. In his theory of hierarchy of needs, he hypothesized that individuals' belongingness needs become crucial once their lower-order needs for physiological satisfaction and safety have been met. The theory posited that a sense of belonging is cultivated through intimate relationships such as marriage, membership to groups, and close friendships. Moreover, the satisfaction of belongingness needs was hypothesized to lead to a desire for the next, higher-order esteem needs and eventually to the highest level need, a need for self-actualization that stems from individuals' own intrinsic motivation to achieve goals.

Representing a more recent development in motivation theories, self-determination theory also posits that every individual has innate psychological needs, those for competence, autonomy, and relatedness, that serve as the basis for self-motivation, social development, and mental health (Ryan & Deci, 2000). These three basic needs must be satisfied across the lifespan to facilitate an individual's optimal experience, psychological development, and well-being. Guided by self-determination theory, relatedness has been conceptualized as "the connection and sense of belonging with others" that provides emotional security through which individuals can "actively explore and effectively deal with their worlds" (Martin & Dowson, 2009, p. 335). A sense of belonging serves as intrapersonal energy in the self-system process, boosting the activation of positive affect and mood (Furrer & Skinner, 2003). The need for belonging also involves "developing secure and satisfying connections with others in one's social milieu" (Deci, Vallerand, Pelletier, & Ryan, 1991, p. 327) and experiencing care, respect, and acceptance in social relationships. The theory implies that the need for belonging can be fulfilled through warmth and support coming from significant others.

As "a complementary perspective" to understanding relatedness or belongingness from the framework of self-determination theory, Baumeister and Leary's (1995) *need to belong* hypothesis has been widely applied in social and educational psychology (Martin & Dowson, 2009, p. 330). Baumeister and Leary (1995) defined the need to belong as an innate and fundamental human desire that motivates individuals to form and maintain positive and significant interpersonal relationships of all kinds (p. 497). The *need to belong* hypothesis suggests that fulfillment of the belongingness need leads to positive emotional

responses that can drive individuals' achievement behaviors such as participation, self-regulation, response to challenge, and strategy use (Meyer & Turner, 2002).

The need to belong motivates people to establish social bonds and to be accepted by others (Leary & Cox, 2008). This is evidenced by individuals' tendency to develop group identifications and relationships with strangers quickly and easily. Also, individuals are generally disinclined to abandon interpersonal connections once social bonds are formed. Moreover, those who lack experience of belongingness are susceptible to problems in their psychological well-being. In spite of individual differences in the strength and desire for belonging, every human has a basic need "to form and maintain at least a minimum quantity of interpersonal relationships" (Baumeister & Leary, 1995, p. 499). That is, the need to belong drives and constrains human behavior to a significant extent.

Closely associated with the notion of sense of belonging, Wolff (1950) claimed that smaller groups promote member participation because such groups are more likely to be unified in their purpose; and individual members perceive stronger affiliation with their group. According to Finn, Pannozzo, and Archilles' (2003) explanation, these principles suggested by Wolff guided a group of sociologists to develop the concept of *group cohesiveness* (Homans, 1974; Shaw, 1976) and that of *psychological sense of community* (Sarason, 1974), which served as earlier notions of sense of belonging (Baumeister & Leary, 1995). *Group cohesiveness* refers to the degree to which individual members are attracted to their group and value their participation in the group. Indicators of cohesive groups include friendliness, cooperation, and interpersonal attraction. Research has implied that

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cohesive groups exert a strong influence on the members' behavior as the pressure to conform to a group norm is greater in cohesive groups (Mullen & Copper, 1994).

Psychological sense of community is another concept that is broadly associated with a sense of belonging. It is generally defined as "the perception of similarity to others, … the feeling that one is part of a larger dependable and stable structure" (Sarason, 1974, p. 157). Researchers have suggested that there are four primary purposes underlying the fulfillment of *psychological sense of community* (McMillan & Chavis, 1986). These purposes include: the feeling of belonging or membership; the sense of influencing or mattering to the group; integration and fulfillment needs; and shared emotional connection or bond with group members. Although the concept of sense of community and that of sense of belonging are not clearly distinguished, researchers in general have suggested that sense of community concerns feelings of *fellowship* while sense of belonging focuses on *perceived fit* or *acceptance* within a social group (Strayhorn, 2015, p. 46).

Finally, in addition to conceptualizing the nature of a feeling of belonging, researchers have examined patterns of common human behaviors that stem from individuals' desire to fulfill their general need to belong. In particular, Leary and Cox (2008) argued that people often exhibit behaviors that are related to increasing the probability of acceptance from others. For example, people seek relationships with those who are likely to accept them. Accordingly, they assess the potential value of certain relationships based on indicators of psychological similarity that generally facilitate social acceptance (e.g., ethnicity, language, and social status). Once the reference group is determined, individuals make great efforts to conform to the social norms of the group.

Sometimes, they even break their own standards or harm themselves or others in the pursuit of acceptance and belonging.

Previous literature suggests that there have been various viewpoints on theorizing and conceptualizing a sense of belonging. However, such seemingly different perspectives all point to the universal nature of the sense of belonging that is experienced by every individual embedded in social contexts. Although individuals are motivated to form various kinds of interpersonal relationships that are characterized by distinctive behavioral and emotional features and unique criteria for acceptance and rejection, they may be motivated to belong generically regardless of the relationship types and features (Leary & Cox, 2008). Thus, it is critical for varying contexts of social relationships to provide individuals with sufficient support for meeting their need to belong. Among different types of social groups and environments, the present study will focus on exploring how the educational context can shape and satisfy students' general need to belong to their surrounding academic community.

Importance of Sense of Belonging in the Educational Context

Positive interpersonal relationships are treated as not only valued outcomes in themselves but also as a vital factor contributing to enhancing healthy human functioning and social and emotional development (Royal & Rossi, 1996; Weisenfeld, 1996). Through relationships, individuals receive help to deal with challenges and emotional support from each other, which are crucial for learning to take place (Martin & Dowson, 2009). Indeed, in a learning community, social relations and knowledge-creation are closely associated:

learners are viewed as constructing knowledge with others in a process of negotiation among individuals in a community (Scardamalia & Bereiter, 1994; Prawat & Peterson, 1999).

This viewpoint is guided by socio-constructivist views that portray learning as a constructive process embedded in social and cultural context. According to this theoretical perspective, the dynamics of social or interpersonal relations are regarded as a crucial mediator of students' classroom learning as well as their school lives (Moje & Lewis, 2007; Panofsky, 2003; Vygotsky, 1978). Researchers have claimed that supportive and respectful interactions between a student and more knowledgeable others, such as a teacher and advanced peers, can provide scaffolding through which the student can enter his or her own zone of proximal development (ZPD) (Erickson, 1996; Vygotsky, 1978). ZPD is known as a learner's current and potential level of development in which deeper learning takes place. In short, positive social relations that are formed by an inclusive classroom climate play an essential role in promoting meaningful learning and active participation among students (Panofsky, 2003).

Schools play a crucial role as social organizations in developing students' sense of belonging and meeting their need to gain acceptance as an important member of the school community (Osterman, 2000). Likewise, classes in school are considered as key affiliation groups for students that influence their classroom behavior (Finn et al., 2003). Research has discovered that students' sense of belonging in the school context is associated with a wide range of adaptive outcomes. For example, students have been found to be more likely to internalize their motivation to learn and to be autonomously engaged in their studies

when they feel greater sense of belonging in school (Bateman, 2002; Goodenow, 1993; Niemiec & Ryan, 2009; Osterman, 2000). Additionally, belongingness in school can predict psychological adjustment, conceptualized as lower levels of emotional distress and depressive affect (Eccles, Early, Frasier, Belansky, & McCarthy, 1997; Roeser, Eccles, & Sameroff, 1998). Thus, researchers have increasingly pointed out the urgency of addressing students' need to belong in educational contexts as students' motivation and academic performance are strongly affected by whether the school environment satisfies their social and interpersonal needs on an ongoing basis.

In a classroom operating as a learning community, students pursue the goal of constructing knowledge with others and advancing shared or collective knowledge (Watkins, 2005). That is, both individual and shared knowledge are considered as the product of social processes. Students' perceived relatedness or belonging in the classroom is connected to the feeling that they are accepted, respected, and valued by their teacher and peer students (Goodenow & Grady, 1993). Relatedness acknowledges the interconnectedness of the social, academic, and affective dimensions of the self (Martin & Dowson, 2009, p. 331). Indeed, belongingness in the classroom has been commonly conceptualized as perceptions of support from teachers and peers in academic and personal dimensions (Osterman, 2000; Van Ryzin, Gravely, & Roseth, 2009; Wentzel, 1999). Research has provided considerable evidence that perceived acceptance from the wider peer group as well as supportive teacher-student relationships are strongly associated with important psychological processes and adaptive motivational characteristics such as academic engagement, self-efficacy, intrinsic motivation, and prosocial behavior

(Anderman & Freeman, 2004; Connell & Wellborn, 1991; Marks, 2000; Niemiec & Ryan, 2009; Roeser, Eccles, & Sameroff, 1998; Wentzel, 2005).

However, not all classrooms create a sense of belonging for all students. According to Watkins' (2005) review of published research into classroom as communities, researchers have found that students feel an increased sense of classroom belonging and relatedness when they are situated in a classroom in which a sense of community is built. Osterman (2000) suggested that a community emerges when its members experience a "shared and emotional sense of connection" and thus experience a sense of belonging (p. 324). A classroom community usually involves student-centered and collaborative learning activities, promoting a balanced distribution of contribution across students. Additionally, when diversity of students' contributions is valued and embraced, their sense of responsibility to help each other learn grows. That is, as the sense of classroom belonging is enhanced over time among students, they become more engaged and more active agents in learning and constructing knowledge with each other. Watkins (2005) stated that community building in schools can be best achieved through "a caring, pro-social, learning-oriented approach to the relations between all parties" (p. 50).

Sense of belonging has received increasing attention from educational researchers because of its greater importance among particular student population. Davis et al.'s (2004) qualitative study revealed five major themes of undergraduate experiences that emerged from interviews with black students who were enrolled in a predominantly white institution. The interviewed students clearly pointed to the pervasive nature of experiencing unfairness and isolation as well as having to prove that they are worthy and capable. Researchers have

argued that sense of belonging becomes crucial among students who feel themselves marginalized or alienated, as members of socially stigmatized student groups are likely to protect their self-esteem by using maladaptive coping strategies including discounting the value of academic achievement or staying in their own comfort zone (Davis et al., 2004; Strayhorn, 2015).

Overall, a growing number of researchers have conceptualized student sense of belonging in school or classroom contexts and provided insight into its close link to positive aspects of student life experience. Nevertheless, relatively few studies have so far investigated the sources of perceived belongingness, that is, how sense of belonging is formed and built in education contexts (Strayhorn, 2012). In the next section, a review of relevant theories and previous research findings will be presented, focused on the literature about primary sources of sense of belonging in a classroom situation.

Primary Sources for the Development of Sense of Belonging in the Classroom

With respect to the sources of perceived belonging to a classroom community, various aspects of classroom features have been investigated, including teacher involvement, peer acceptance, and instruction style. Some researchers have viewed that social support from, or relatedness to, both teachers and peers are crucial sources of perceived classroom belongingness (Booker, 2007; Furrer & Skinner, 2003; Goodenow & Grady, 1993). Others have emphasized the characteristics of instruction that encourage students to engage in active participation and interaction (Booker, 2007; Freeman, Anderman, & Jensen, 2007).

Goodenow (1993) proposed three contributors to perceived belonging including general sense of belonging, teacher support, and peer acceptance. A general sense of class belonging usually refers to a student's identification with the class group, or the feeling that he or she is an important and vital part of the class community (Freeman, Anderman, & Jensen, 2007). Researchers have emphasized involvement, warmth, and encouragement of student participation as specific types of teacher support that are related to the sense of class belonging and relatedness (Booker, 2007; Freeman, Anderman, & Jensen, 2007; Skinner & Belmont, 1993). Teacher involvement refers to "the quality of the interpersonal relationship with teachers; its opposite is rejection or neglect" (Skinner & Belmont, 1993, p. 573), and it consists of affection, attunement, dedication of resources, and dependability. Research has consistently found that support from teachers (e.g., feelings of acceptance, caring, being respected, and warmth) is associated with higher motivation and achievement among students in general (Goodenow, 1993a; Martin & Dowson, 2009; Roorda, Koomen, Spilt, & Oort, 2011).

Although researchers have so far provided considerable evidence supporting the significance of the affective dimension in teacher-student relationships in enhancing students' sense of relatedness and academic engagement (Anderman & Freeman, 2004; Skinner & Belmont, 1993; Roorda, Koomen, Spilt, & Oort, 2011), there is a relative paucity of research with respect to peer relationships as a source of sense of community and motivation (Osterman, 2000). Existing research finds that peer groups play an influential role in the socialization of students' engagement and achievement (Ryan, 2000). Also, student-to-student behaviors that contribute to a supportive communication climate

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create feelings of community among student members (Dwyer et al., 2004). Nevertheless, research in students' perceived belonging to their class has not fully addressed characteristics of peer relationships in the college classroom context, such as to what extent peer interactions make students feel respected or valued and how supportive is their communication environment (Booker, 2007; Freeman, Anderman, & Jensen, 2007; Dwyer et al., 2004).

Peer acceptance is another key aspect of explaining the peer group influence on students' academic experience. Peer acceptance is defined as the extent to which a student is considered amiable or likeable by his or her classmates; and it has been considered as a likely antecedent of feelings of loneliness and belongingness (Mouratidis & Sideridis, 2009). According to some research findings based on either student or teacher reports, students who perceived themselves as respected and accepted by their peer groups were likely to show higher levels of academic motivation and engagement than those who did not (Furrer & Skinner, 2003; Goodenow & Grady, 1993). In schools and classrooms, students are situated in a social environment in which they interact with peers around them. Experiences with peers often engage students in exchanging information about academic topics, observing one another as models, and perceiving peer pressure for norms and values regarding their school or class involvement (Ryan, 2000). Such interactions with peers have been widely shown to influence students' beliefs and behaviors in daily life, which in turn can predict changes in their academic outcomes (Osterman, 2000; Ryan, 2000). In addition, peer relationships that promote feelings of membership seem essential for the development and maintenance of academic motivation and engagement (Furrer & Skinner,

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2003; Goodenow & Grady, 1993). Accordingly, some researchers have investigated factors contributing to forming a climate of connection and belonging among students in classroom (Booker, 2007; Dwyer et al., 2004).

Based on research findings that have demonstrated the influential role of peers to children and adolescents in school, Ryan (2000) acknowledged that peer groups are the key to the socialization of motivation, engagement, and achievement. Peer groups have also been found to influence students' school participation. Osterman (2000) indicated that there is clear research evidence of a strong link between peer acceptance and dropping out of school. School dropouts across studies generally reported feeling alienated or rejected from peers and had no sense of school membership. Osterman also noted that dropping out of school was related to associating with other potential dropouts as it increased pressure to reject school norms and values. However, peer effects do not always lead to pressure for change toward similarity in engagement or achievement. Ryan (2000) explained that students' responses to change (i.e., pressure or resistance to change) depend on their perceived similarity with peers and personal value that they attach to certain characteristics.

Consequently, the importance of experiencing peer acceptance calls for attention to creating a supportive classroom climate that fosters the sense of connectedness among students. Within a connected classroom climate, students may feel comfortable participating in class and expressing themselves in communication with other students because they perceive a strong within-group bond and a cooperative communication environment (Dwyer et al., 2004). In contrast, if a classroom environment does not provide students with sufficient support for a sense of community to develop, they may become

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silent during class activities in order to avoid the personal risk of being put down or judged negatively by peers (Osterman, 2000). For example, Booker (2007) showed that students reported stronger perceptions of classroom community when they interacted with their classmates in positive ways. However, their sense of community tended to be affected adversely when they experienced prejudice or intolerance among peers. Therefore, the degree to which students engage in class participation (e.g., posing questions, taking a risk of expressing minority opinions) can depend on whether peers support their experience of the sense of belongingness by forming a connected and cooperative communication environment.

In sum, the notion of sense of classroom belonging has been related to several aspects including perceived classroom belongingness (Booker, 2007; Freeman et al., 2007); supportive communication or connected classroom climate (Dwyer et al., 2004); and relatedness to teacher and peers (Furrer & Skinner, 2003). Yet, still unclear is whether it would be plausible to measure students' overall sense of belonging in the classroom community by taking into account those different aspects of perceived belonging and relatedness in classroom. Taking into consideration the limitation of previous research, I focused in this project on individual students' perceptions about the degree to which they feel they belong to their class group in general. In the next section, I explore the existing literature on the influence of classroom contextual variables on feelings that one belongs to one's class group, particularly focusing on the following three variables: class size, instruction mode, and classroom goal structures.

Classroom Contextual Variables Influencing Sense of Belonging

A related line of research has investigated contextual attributes of classes as potential antecedents of sense of belonging or relatedness. Class environment factors that have been discovered to influence relatedness between teacher and students as well as among students include the physical space (e.g., size, seating arrangement, organization of furniture and equipment, lighting, temperature); the time of day when classroom activities take place; and the physicality of the learning environments (e.g., collaborative activity, interaction patterns) (Marx, Fuhrer, & Hartig, 1999; Stone, 2001). It is noteworthy that some of these classroom attributes can contribute to predicting not only students' sense of belonging to a classroom community but also their academic achievement motivation and engagement.

Class size as a course attribute. For instance, Finn, Pannozzo, and Achilles (2003) found from their review of nine studies that students situated in small classes in elementary school tended to be more engaged in learning behaviors than those from large classes. They suggested that psychological sense of community can be one mechanism to explain the relationship between class size and academic motivation.

Previous class size studies conducted around the world have generally provided evidence supporting the beneficial influence of small class sizes on student-student and student-teacher relationships, often considered as critical sources of sense of classroom belonging. For example, Blatchford, Bassett, and Brown (2011) examined students from 46 primary and secondary schools in the United Kingdom, and found from both groups of schools that the smaller class sizes were, the more frequently students received attention

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from their teacher and the more actively students interacted with the teacher. Moreover, such a pattern was found to hold for both low-achieving and high-achieving students. Another example can be found from Harfit and Tsui's (2015) qualitative research in secondary school classrooms in Hong Kong. Using case study methodology, the authors interviewed four pairs of teachers recruited from English language classes consisting of students with comparable English ability. Using data collected from classroom observations, interviews, and discourse analysis, the authors found that students in smaller classes that ranged from 21 to 27 people reported a stronger sense of belonging, closer relationships with their teacher, and greater peer support and cooperation, compared to students from larger classes that ranged from 37 to 41 people. Additionally, Harfit and Tsui noted that students' on-task behaviors (e.g., initiating questions and responding to teachers' promptings) were more frequently observed from smaller classes than larger classes, indicating that smaller class sizes might be conducive to enhancing students' engagement with learning.

According to Cuseo's (2007) review of research in higher education over the previous three decades, large class size has been shown to be detrimental to college students' classroom participation and learning outcomes (MacGregor et al., 2000; McKeachie, Pintrich, Lin, & Smith, 1986). In the field of higher education in general, a class size of 15 or fewer students has been recommended as optimal for creating a supportive climate that fosters students' sense of community in the class (NEA, 2008). Interestingly, a substantive body of research has shown that taking a course with large enrollment may have a critical effect on first-year college students, as these beginning

learners are transitioning from high school to universities with a great number of fellow students (typically over 10,000 students) (Cuseo, 2007). It has been also reported that first-year students across the nation generally show a high attrition rate of more than 25% at four-year institutions (ACT, 2015). Researchers have suggested that this phenomenon is strongly associated with the practice of "herding" first-year students into large classes that are usually gateway courses to their major field of study (Cuseo, 2007, p. 5). By contrast, smaller-class settings have been shown to be more beneficial to students' adjustment and growth in academic interest, compared to larger settings that promote students' "passivity, anonymity, and lack of individual accountability" (Cuseo, 2007, p. 13).

Nevertheless, prior research has revealed inconsistent findings regarding the impact of class size on students' perceived belongingness and learning. Some studies have suggested that the contribution of class size may not be sufficient enough to determine the levels of students' sense of belonging in their classroom. Blatchford (2003) showed that students can be more social in large classes than in small classes, implying that small class sizes do not necessarily lead to creating social communities in the classroom. Likewise, Sidelinger and Booth-Butterfield (2010) found that, regardless of class size, having an opportunity to develop meaningful relationships within the classroom positively predicted undergraduate students' degrees of involvement, or their willingness to talk and participate in class. Although their study indicated that a large class size with more than 51 students was related to decreased interactions among students and between students and teacher, the degree to which class size predicted students' positive perceptions of a supportive and cooperative communication environment in the classroom was shown to be minimal.

Taking into account these mixed results from previous studies, I examined the direct effect of class size on college studInents' sense of belonging and also its indirect effect on student engagement with learning through sense of belonging using a SEM approach.

Instruction mode as a course attribute. Next, style of teaching or instruction mode is another important classroom contextual variable that needs attention in the sense of belonging research. In relation to instruction style, Martin (2006) proposed the notion of *connective instruction* with connectedness and relatedness between teacher and students placed in the instruction context itself. Connective instruction connects teacher and students on three levels: the level of substance and subject matter; the interpersonal level; and the instructional level. The substantive level concerns the extent to which a student is meaningfully connected to the subject content and learning tasks. At the interpersonal level, quality of interpersonal relationships matters in the classroom context, such as focusing on students' views and respecting students' individuality. In the relationship between the student and instruction, it becomes important to provide students with ample opportunities to develop competence, learn from their mistakes, and keep up with schoolwork.

Consistent with the theoretical framework of connective instruction, previous research has revealed across various higher educational contexts that reliance on lecture-based instruction reduces students' levels of sense of belonging as well as classroom learning and participation (Light, 2001). Booker's (2007) results of open-ended surveys showed that students' perceptions of classroom belonging were frequently connected with an instruction style that provided ample opportunities to actively discuss, collaborate, and share ideas. Sidelinger and Booth-Butterfield (2010) also emphasized the importance of

using a participatory teaching style, rather than to use the traditional lecture format, in order to foster a sense of linkage among students and creating a supportive communication environment that makes students feel comfortable expressing their feelings or opinions in the college classroom.

In terms of classroom learning, McKeachie et al. (1986) showed that college students who received lectures as a primary method of instruction tended to show negative attitudes and reduced motivation toward further learning, although lectures were found to be as effective as other instruction methods in measures of knowledge acquisition (e.g., final exam). Likewise, Lammers and Murphy (2002) stressed the benefit of using interactive teaching activities such as class discussions in college classroom by suggesting that such methods of instruction, compared to lectures, can be more effective for engaging students in active learning as well as deep thinking in higher education settings. Additionally, some researchers have argued that class size and instruction mode are associated in that a large class size usually leads an instructor to use lecturing as a dominant instruction method, which is likely to reduce students' active involvement with the teacher, classmates, and the subject matter; and to reduce levels of student participation and engagement in classroom activities (Cuseo, 2007; Kim et al., 2017).

This line of research suggests that a course's instruction mode can be a potential antecedent of students' sense of belonging in the class, and subsequently their engagement with course tasks. That is, the mode of discussion-oriented or connective instruction along with smaller classroom settings can help facilitate students' identification with a class and make meaningful connection with instruction, which in turn could lead to increased

academic engagement and motivation (Martin & Dowson, 2009). In this project, I took into consideration both teaching style and class size of undergraduate courses, and evaluated whether these course-related attributes would predict college students' sense of classroom belonging and their behavioral or emotional engagement in the classroom.

Classroom goal structures as a course attribute. As a third classroom attribute going beyond the format and quality of teaching method, the impact of the construct of classroom goal structures on students' feelings of connectedness or belonging to their classroom has received some research attention. Rooted in achievement goal theory, goal structures can be defined as types of goal orientations for "engaging, choosing, and persisting at different learning activities" (Meece, Anderman, & Anderman, 2006, p. 490). Classroom goal structures have been conceptualized as types of goal orientations that teachers create within the classroom, generally described as the dichotomy between "mastery" and "performance" goal orientations. Classroom environments with mastery-oriented goal structures focus on developing students' academic skills, solving problems, and seeking improvement in their learning processes; whereas those with performance-oriented goal structures emphasize social comparison based on learning outcomes or grades and encourage competition (i.e., doing better than others) among students (Linnenbrink, 2005; Meece et al., 2006; Wolters, 2004). Performance goal structures can be further distinguished into performance-approach and performance-avoid orientations depending on whether an emphasis is placed on obtaining favorable judgments about one's competence (i.e., performance-approach) or on avoiding unfavorable judgments (i.e., performance-avoid).

Previous research has suggested positive links between mastery goal orientations in the school or classroom environment and student sense of belonging. Roeser, Midgley, and Urdan (1996) found that the more students perceived the goal structure of a class to be focused on the task and on learning (i.e., mastery) in middle school, the higher they reported feelings of school belonging. Likewise, Anderman and Anderman's (1999) longitudinal study on the transition to middle school revealed that students' sense of belonging in middle school was associated with changes in goal structures in classes. The study showed that increases in ability goal orientation, or performance-oriented goal structures, in middle school classes negatively predicted students' perceptions of school belonging. By contrast, students' sense of belonging was positively predicted by increases in mastery orientation in the classroom. Similarly, in her analysis of data from a sample of upper elementary students in math classes, Linnenbrink (2005) found that students were likely to exhibit help-seeking behavior (e.g., asking classmates or teachers for help in learning) and achieve academic success, when teachers used small group practices that focused on students' improvement and mastery. Although a direct measure of sense of belonging was not included in this study, such findings imply a beneficial influence of a mastery classroom goal structure on building students' positive perceptions about their relationships with teacher and classmates.

Nevertheless, the extent to which classroom goal structure variables contribute to shaping college students' sense of belonging has remained largely unexplored. Existing evidence is heavily focused on the K-12 school contexts. Further empirical research in the college classroom is imperative to deepen our understanding of how perceived support,

care, and respect from teacher and classmates can be related to certain teaching practices that place an emphasis either on comparing the relative abilities and outcomes among students (i.e., performance goal orientation) or on appreciating students' efforts and improvements in their understanding and learning. Therefore, beyond examining the predictive relationships between course attributes and student outcomes, I investigated whether salient goal structures in a classroom would significantly influence students' social, interpersonal experience and contribute to the formation of sense of classroom belonging among students. In the next section, I provide a further literature review of previous research and theories on academic engagement, which was the second primary dependent variable in my study.

ACADEMIC ENGAGEMENT

Definitional Issues of Academic Engagement

Academic engagement, often referred to as student engagement in academic work, has been conceptualized as an individual student's psychological process involving attention, interest, investment, and effort in the work of learning (Marks, 2000). In motivation research, engagement with learning is viewed as an aspect of achievement motivation, which is composed of a set of achievement-related beliefs and emotions that would direct learner behavior to achieve certain learning goals (Wentzel, 1999). Ample research evidence has suggested that engagement serves as a crucial motivational construct that leads to student success, as engaged learners tend to show interest in learning, enjoy challenges, and persist in carrying out tasks (Osterman, 2000). Research has consistently

found that high levels of academic engagement, or active participation in learning activities, can contribute to students' learning to a great extent in terms of their grades; long-term academic achievement; school retention; and eventual completion of school (Fredricks, Blumenfeld, & Paris, 2004; Furrer & Skinner, 2003; Skinner & Belmont, 1993).

Researchers have also developed the concept of engagement that is tailored to the context of higher education institutions and emphasized the critical role of academic engagement in explaining college student success. Astin (1999) conceptualized engagement as student involvement, which refers to ''the amount of physical and psychological energy that the student devotes to the academic experience'' (p. 518). Likewise, Kuh (2003) defined student engagement as "the time and energy students devote to educationally sound activities inside and outside of the classroom" (p. 25). In light of such definitions, highly engaged students tend to expend much time and effort in their studying, actively interact with faculty and other students, and participate in student organizations or other educationally purposeful activities on campus. Previous research has clearly indicated the beneficial effect of academic engagement on college students' knowledge acquisition, skill development, and learning in their courses, which all could lead to successful outcomes (Kuh, 2007; Tinto, 1997).

In terms of the nature of engagement, it has been also typically treated as a situational or "state" variable rather than a fixed attribute of a student. That is, academic engagement is responsive to changes in context such as family interactions, school practices, and policies (Fredricks et al. 2004). Van Ryzin, Gravely, and Roseth's (2009) study also found that cross-sectional data explained a great proportion of the variance in

engagement, but relatively less of the variance in hope; while short-term longitudinal data accounted for a greater variance in hope. Some other researchers have distinguished engagement versus disaffection, which pertains to the intensity and emotional quality of students' initiation and completion of learning activities (Connell & Wellborn, 1991). The opposite of engagement, or disengagement is operationalized as passivity, lack of initiation, and giving up, which are associated with feelings of being excluded and helpless.

Originated from Connell and Wellborn's theory, the idea of *the self-system model of motivational development* suggests that engagement serves as a key pathway through which motivational processes result in learning and development over time. The model posits that social contexts (e.g., parents, teachers, peers, school, neighborhood, community) influence innate psychological needs, including needs for belonging, autonomy, or competence, which in turn form the basis of the construction and development of an individual's' self-system processes (Connell & Wellborn, 1991; Deci & Ryan, 2000; Furrer & Skinner, 2003). Consequently, self-systems or self-perceptions either facilitate or undermine engagement versus disaffection and other indicators of motivated action such as selection of tasks and coping, which would ultimately lead to an individual's development outcomes (e.g., social, cognitive, personality) (Skinner, Furrer, Marchand, & Kindermann, 2008).

Operational Definitions and Dimensions of Academic Engagement

Despite the general consensus that academic engagement is an important predictor of learning achievement and other indicators of student success, there have been a wide

range of perspectives toward the operational definition of the engagement construct (Appleton, Christenson, & Furlong, 2008; Fredricks et al., 2004). Klem and Connell (2004) measured student engagement in terms of *Ongoing Engagement* (e.g., exerting effort on school work, paying attention in class, valuing academic achievement in school) and *Reaction to Challenge* (e.g., projection, denial, anxiety amplification, positive coping). Similarly, Ryan (2000) viewed engagement as observable behaviors of students that include persistence and effort on academic work, participation in classes, and time on homework. Furrer and Skinner (2003, p. 149) defined engagement as a*ctive, goal directed, flexible, constructive, persistent, focused interactions with the social and physical environments*.

Furrer and Skinner (2003) argued that engaged students are likely to maintain their behavioral involvement and positive emotions. Based on this underlying assumption that high-quality learning occurs as a result of engaged behaviors and emotions, substantive research has measured students' engagement with learning by assessing their ongoing patterns of behavioral and emotional action or participation in learning activities (Meyer & Turner, 2002; Skinner et al., 2008). Indeed, according to Appleton et al.'s (2008) critical review of how student engagement had been operationalized and measured, most of existing definitions reflected *behavioral* components, and many of other definitions included *emotional* or *affective* components. The behavioral dimension of academic engagement has been typically measured by the degrees of student effort, participation, intensity, and persistence during the initiation and execution of learning activities. In terms

of the emotional dimension, the levels of enthusiasm, interest, and feelings of enjoyment have been usually measured.

By contrast, relatively few definitions of academic engagement focused on measuring *cognitive* or *academic* components (Appleton et al., 2008; Fredricks et al., 2004). Nevertheless, a substantial body of research has contributed to conceptualizing cognitive engagement. For example, cognitive engagement has been deemed as reflecting the quality of student effort in contrast to the mere quantity or frequency of effort (Jones, Johnson, & Campbell, 2015; Linnenbrink & Pintrich, 2003). Jones, Johnson, and Campbell (2015) argued that cognitive engagement is distinct from the notion of attention allocation, which refers to a student's allocation of cognitive resources to a learning task and is measured by sentence-by-sentence reading times. The authors considered cognitive engagement as the quality of the student's thinking, or how the cognitive resources are actually used through various cognitive strategies (e.g., rehearsal, elaboration). Their study found that attention allocation (i.e., reading time) positively predicted engagement, which in turn led to an increase in conceptual change among student readers.

Prior research has generally identified two key components of cognitive engagement: use of cognitive strategies and self-regulation (Linnenbrink & Pintrich, 2003). Cognitively engaged students are likely to seek to understand learning content and materials at a deeper level by actively using various strategies such as elaboration (e.g., put important ideas into one's own words) and organization (e.g., make ideas fit together). Also, students who demonstrate cognitive engagement in learning tasks tend to become metacognitive, or self-regulatory, about their thinking and understanding (e.g., asking

themselves questions, planning or monitoring their own learning). On the other hand, Greene and Miller (1996) conceptualized cognitive engagement as a two-level construct: meaningful and shallow cognitive engagement. Examples of meaning cognitive engagement includes planning, monitoring, and summarizing learning materials; whereas shallow cognitive engagement includes rehearsing and memorizing answers or definitions. In sum, although the number and types of engagement varied, such different conceptualizations in previous research consistently imply that academic engagement should be understood as a multidimensional construct.

Motivational Variables and Academic Engagement

Researchers have suggested that individual students' willingness to engage with learning tasks, in a behavioral, emotional or cognitive manner, can be predicted by their various motivational characteristics and can even mediate between motivation and academic achievement (Fredricks et al., 2004). Especially, guided by modern expectancy-value theories, prior research has provided substantial evidence supporting that expectation of success and subjective task value would uniquely predict achievement related choice, behavior, and performance of students (Eccles, 2005; Eccles & Wigfield, 2002).

Expectancy is a forward-looking concept that refers to individuals' perceptions about how well they are able to do certain task, or the likelihood of success on the task (Eccles, 2005; Schunk, 2016). One of the crucial self-schemata that contribute to building one's expectancy is self-efficacy which is generally defined as an individual's judgements of his or her own ability to do a task in specific domain (Bandura, 1997). Student self-

efficacy has been typically measured by asking individual students to self-report their beliefs, for example, whether they believe they will receive a good grade in particular class (Pintrich, Smith, Garcia, & McKeachie, 1993). Researchers have discovered that students who feel efficacious about their abilities to perform academic tasks and succeed are likely to exhibit achievement behaviors such as effort, persistence; whereas students with low expectancies (Bandura, 1997; Linnenbrink & Pintrich, 2003). Previous research has indicated that an increased sense of self-efficacy about a learning task can enhance both interest and value for the task (Bandura, 1997). Beyond the behavioral and affective aspects of engagement, many studies have also found that value of academics and self-efficacy respectively made a unique contribution to explaining the levels of cognitive engagement among college students (Linnenbrink & Pintrich, 2003; Walker, Greene, & Mansell, 2006). Overall, researchers have suggested that such positive relationships between self-efficacy and academic engagement can be generalizable across different gender, age, and ethnicity.

Task value is generally defined as the perceived importance or usefulness of a task and reasons for doing the task, related to the "Why should I do the task" question (Eccles, 2005; Schunk, 2016). According to modern expectancy-value theories, task value consists of four components, including attainment value, interest or enjoyment value, utility value, and relative cost. Attainment value refers to the subjective importance of doing well and succeeding in the task. Interest value, which is similar to the concept of intrinsic motivation, reflects inherent enjoyment individuals perceive while doing the task. Utility value refers to the importance of the task as a means to achieve a future goal. Finally, relative cost means the belief about costs that arise from engaging in the task. Being consistent with

previous research evidence showing the beneficial effect of high self-efficacy on academic engagement, research findings across different educational settings have indicated that the value components of student motivation can positively predict not only persistent effort and task involvement, but also the use of a range of cognitive and metacognitive learning strategies (Pintrich & De Groot, 1990; Appleton et al., 2008). Perceptions about task value in the classroom situation have typically been measured by self-report type items that ask individuals to rate the degree of attainment, interest, and utility value of learning the class or course materials. On the basis of the aforementioned theoretical framework, in this proposed study, I will take into account the concepts of self-efficacy and task value as primary predictor variables of academic engagement among college students.

According to Eccles and her colleagues' theoretical model, it is hypothesized that the formation of individuals' expectancies and values is influenced by various social and cognitive factors. Specifically, a cultural milieu (e.g., stereotypes, family demographics) affects socializer's beliefs and behavior, which subsequently influences individuals' perceptions about others' expectations as well as interpretations of their own achievement outcomes. Such gradually built perceptions and interpretations shape individuals' general self-schemata, long-term and short-term goals, and affective reactions toward certain achievement tasks. This set of task specific beliefs in turn directly influence one's expectancies and values of individuals.

Prior research has suggested the influential role of sociocultural factors on motivation of students from various demographic backgrounds. One of the salient factors that researchers have emphasized includes cultural identity. Previous studies have shown

how minority students across various educational contexts come to disidentify with goals of school and devalue academic success, as they experience cultural conflicts between their home and school environment which reflects the norms and practices of majority culture (Anderman, 2004; Faircloth & Hamm, 2005). Also, Steele's (1997) stereotype threat theory poses that African American and Latino students are likely to experience the fear of confirming a negative stereotype of their academic abilities. Furthermore, previous studies have suggested that such stereotype threat can be detrimental to ethnic minority students' academic motivation as they are trying to disassociate their self-concept with academic performance to protect their self-esteem.

CONNECTIONS BETWEEN STUDENT SENSE OF BELONGING AND ACADEMIC ENGAGEMENT

Research Linking Sense of Belonging and Academic Engagement

Prior research has indicated close associations between feelings of belonging and the engagement construct. Need for belongingness has been considered as a crucial psychological need that fosters achievement motivation, as relationships can affect a set of achievement-related beliefs and emotions that would direct behavior to achieve certain goal (Martin, 2008; Martin & Dowson, 2009; Wentzel, 1999). Research has shown that students who feel themselves as if they are connected with others are likely to not only learn about themselves but also acquire the beliefs, values, and achievement motivation that are needed to function effectively in academic environments (Freeman et al., 2007; Martin & Dowson, 2009). In other words, positive relationships can be regarded as "a vital underpinning of

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student motivation, engagement, and achievement" (Martin & Dowson, 2009, p. 344). Researchers have also suggested that the fulfillment of the belongingness need may lead to positive emotional responses that can motivate achievement behaviors such as participation, self-regulation, response to challenge, and strategy use (Meyer & Turner, 2002).

Bringing this perspective into classroom settings, researchers have investigated specific links between classroom practices related to different sources of a sense of classroom belonging and individual students' engagement with learning tasks in classroom. For example, Martin and Dowson (2009) suggested that the ways teacher and peer students influence a student's academic motivation are either directly or indirectly shaped by interpersonal relational processes. Some of the widely used practices to foster a sense of belonging in classroom include those that help students feel valued, develop supportive relationships, and establish a meaningful place in a group (Martin, 2008). With respect to teacher-related belonging (i.e., feeling acceptance, respect, warmth or affection from teacher), a meta-analysis from Roorda et al. (2011) revealed that affective teacher-student relationships had strong, positive associations with academic engagement. According to Klem and Connell (2004, p. 270), for both elementary and middle school students, high levels of engagement in school were reported from those who perceived their teachers as *creating, well-structured learning environment* with high and fair expectations. Likewise, student-faculty interaction has been proved to be one of the essential college experience variable that is strongly connected to student retention and involvement (Cuseo, 2007). Another noteworthy research finding is that students' initial perceptions of teacher-related belonging that was measured by teacher support and availability contributed to higher

levels of engagement in learning, which in turn elicited increased support for belongingness from the teacher, suggesting a reciprocal link between belongingness and engagement (Furrer & Skinner, 2003; Skinner & Belmont, 1993).

Regarding peer-related belonging, research has suggested that students' interest in classroom participation may decrease particularly when they experience prejudice or intolerance among peers (Booker, 2007). Several studies have found that students who perceived themselves as respected and accepted by their peer groups tended to report higher levels of academic motivation and engagement than those who did not (Furrer & Skinner, 2003; Goodenow & Grady, 1993). Wentzel (2005) argued that supportive peer relationships provide contextual affordances that can help individual students effectively grow their interest in learning and pursue academic goals. She explained that supports from a peer group would lead students to perceive their peer relationship as "providing opportunities to achieve academic goals"; as "being safe and responsive to their academic strivings; as facilitating their goal achievement through peer resources such as advice and help"; and as "being emotionally supportive and caring" (p. 287). Wentzel also pointed out that this viewpoint can be linked to social learning or socialization theory (Bandura, 1986), which posited that peers who model a sense of importance or enjoyment in engaging with a learning task may exert positive influence on other students' attitudes toward the task.

In addition to interpersonal relationships within a classroom, researchers have also emphasized the link between overall classroom climate and engagement. Students who are situated in a classroom with a climate of cooperation or collaboration generally pursue joint goals and mutual rewards through the support and joint focus of others (Martin & Dowson,

2009). Dwyer et al. (2004) found that college students felt comfortable participating in class activities and expressing themselves in communication with others when they reported feeling that the classroom climate is connected and inclusive. In Dwyer et al.'s study, the connected classroom climate was assessed by the extent to which students perceived a strong within-group bond and a cooperative communication environment within the classroom. Therefore, the degree to which students engage in classroom participation (e.g., posing questions, taking the risk of expressing minority opinions) may be contingent on whether teachers and peers can contribute to creating a connected and cooperative communication environment. Despite research evidence confirming the positive association between sense of belonging and engagement with learning in class, however, belongingness should be understood as a necessary but not sufficient condition for predicting students' educational motivation and outcomes (Martin & Dowson, 2009).

Exploring Benefits of Sense of Belonging to Student Engagement

A large body of research has documented the beneficial effects of students' perceived sense of belonging to school on their behaviors and attitudes toward learning across a wide range of educational settings. For example, students' sense of school membership, or affiliation with school, has been found to increase their valuing of school work, expectancy of success; motivation to learn, engaged effort and participation in secondary school (Goodenow & Grady, 1993; Voelkl, 1995). Similarly, among college students, a sense of belonging to their university has been shown as positively related with academic self-efficacy, intrinsic motivation, task value, and persistence to degree in college

freshman (Anderman & Freeman, 2004; Freeman et al., 2007; Hausmann et al., 2007). Especially, findings from research based on self-determination theory have consistently found evidence validating that the satisfaction of the need to belong in school contributes to increased levels of engagement in school work, which in turn promotes the development of academic skills and psychological adjustment (Van Ryzin et al., 2009). This model implies that the effect of sense of belonging on academic achievement can be mediated by engagement (Marks, 2000; Fredricks et al., 2004).

On the other hand, some researchers have argued that student sense of belonging can serve as an underlying factor that explains the relationship between academic motivation and achievement. For example, in their structural equation modeling study, Faircloth and Hamm (2005) found that high school students' (n=5,494) perceived belonging to their school community mediated between motivational constructs such as self-efficacy beliefs and valuing of school and academic achievement. Their findings revealed that, across all four ethnic groups (i.e., African American, Asian-descent, Latino, European American), the structural model which hypothesized belonging as a mediating factor showed a better fit to data than did the model in which belonging was correlated with academic achievement. Interestingly, among African American and Latino student groups, sense of school belonging fully mediated between motivation and achievement; whereas there was partial mediation for Asian-descent and European American groups. Nevertheless, the results suggested that students' self-efficacy and task value may enhance academic achievement through their positive perceptions of belonging in school, regardless

of their ethnic background. I will test whether such mediation pattern holds in the classroom context among different ethnic or racial groups of college students.

Concerning the beneficial outcomes of feeling a sense of belonging in a classroom situation, substantial research has suggested a positive link between belongingness and academic engagement (Martin & Dowson, 2009; Osterman, 2000; Watkins, 2005). In an elementary school context, for example, children's perceptions of relatedness, or belonging, to the teacher and peers positively predicted their behavioral (e.g., effort) and emotional engagement (e.g., feeling fun or enthusiasm) in classroom activities over the course of a school year (Furrer & Skinner, 2003; Skinner & Belmont, 1993). According to Witt, Wheeless, and Allen's (2004) meta-analysis study, teachers' verbal or non-verbal immediacy, which refers to the extent to which their behaviors (e.g., facial expression, word choice) enhance closeness or liking to students, was found to have positive relations with students' perceived levels of cognitive learning (r = .51 for non-verbal and r = .49 for verbal) as well as affective learning (r = .49 for both types of teacher immediacy).

The majority of this research has, however, been conducted with elementary and middle school students. There have been only a few studies that examined the effects of sense of school or classroom belonging on college students' academic engagement. Walton, Cohen, Cwir, and Spencer (2012) highlighted the positive connection between sense of belonging and engagement by conducting experiments where a sample of college students were divided into control and treatment groups whose opportunities for belonging were manipulated. The treatment group received small cues of social connectedness within groups (e.g., asking for birthdays, grouping by major, personal interest, and hobby). Results

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from their study revealed that students from the treatment group tended to show greater persistence and interest in the given domain-specific tasks such as solving math problems, suggesting the importance of building even minor social connections with other people, or termed as ''mere'' sense of belonging.

Freeman et al. (2007), using a research design similar to that of this project, aimed to examine associations between undergraduate students' subjective sense of belonging in a specific college class and their academic motivation in that class, as well as perceptions of their instructors' characteristics. They administered questionnaires to 238 college freshmen (162 women; 216 Caucasian students) who were enrolled in non-major courses of biology, psychology, and English at a southeastern university in the United States. Participants were asked to respond to class-level items on a 5-point Likert scale regarding the class in which they felt the greatest sense of belonging. By using a series of multiple regression analysis, the authors showed that students' sense of class belonging positively predicted all three motivation variables (i.e., self-efficacy, intrinsic motivation, and task value) even when students' gender and high school GPA were taken into account. In the next multiple regression analysis, three instructor characteristic variables (i.e., warmth and openness, encouragement of student participation, and organization or preparedness for class activities) were entered as independent variables, and all these variables significantly predicted students' sense of class belonging. Additionally, the finding indicated that students' perceptions of their instructors as encouraging student participation were most strongly associated with sense of class belonging.

Zumbrunn et al. (2014) also pointed to the beneficial influence of creating academically and socially supportive classroom contexts at the university level. Their study showed that perceptions of a supportive classroom environment created by the instructor significantly enhanced undergraduate students' sense of belonging, which in turn positively predicted their motivational beliefs and engagement (i.e., the instructor's ratings of class participation and attendance). The course about which the participants reported was an introductory-level prerequisite psychology course, and the size of the classes ranged from 25 to 30 students. Using a mixed-method approach, Zumbrunn and her colleagues collected interview data from six participants, three with the highest scores on sense of belonging and the rest of them with the lowest scores. Results from data analysis revealed that, as the source of their perceived belonging, all students referenced interactions with their classmates and mentioned the importance of discussion and small group activities. It is noteworthy that all three students with lower sense of belonging commonly mentioned that their feelings of belonging were negatively affected by interactions with their classmates who were unsupportive or unfriendly.

Likewise, Wilson et al. (2015) provided evidence supporting the importance of providing students with ample opportunities to build a community and sense of belonging in the classroom context. In their survey study, the authors examined the relationships between sense of belonging and behavioral and emotional engagement among STEM undergraduates from five geographically and culturally different institutions. Results showed that students' perceived belonging at the class level consistently predicted their positive emotional engagement, and this pattern was captured across all five institutions.

On the other hand, the links between perceived belonging at the university level and both forms of engagement were inconsistently significant across the institutions, and even the strength of the significance levels was generally weak.

Ethnicity as a Potential Moderator between Sense of Belonging and Academic Engagement

For decades, researchers have theorized that the need for belonging is fundamental to every human being for motivation and well-being (Baumeister & Leary, 1995; Deci & Ryan, 2002). Likewise, a substantial body of research in the field of higher education has revealed that it is important for students to feel belonging to both academic and social aspects of the institution in building a path to college success (e.g., persistence, academic achievement, degree attainment) (Pascarella & Terenzini, 2005). However, despite its universal nature, prior research has suggested that some students, especially those from ethnic minority backgrounds, may benefit more than others from school and classroom environments that nurture sense of belonging.

In particular, a growing number of researchers have argued that sense of belonging can be more critical to ethnic minority students than their counterpart majority students in college campus and classroom. Indeed, a steadily growing number of studies have shown that students of color or ethnic minority students are likely to feel marginalized and isolated, which in turn may reduce their sense of belonging in campus (Booker, 2007; Strayhorn, 2012; Strayhorn, 2015). Hurtado and Carter (1997) suggested that, for ethnic minority students, the extent to which campus climates are welcoming or inclusive would greatly

influence their sense of belonging, or feeling oneself as a vital part or member of college community. According to results from their survey study, Latino students tended to report lower sense of belonging to college community when they perceived hostile racial climates in which racial or ethnic tension and discrimination existed. Moreover, Hurtado and Carter found that the more selective a college is (i.e., higher mean SAT scores of entering freshmen), the more difficult the transition to college (e.g., seeking help or communicating with instructors, managing resources) for first-year Latino students, which in turn increases their perceptions of a hostile racial climate.

In terms of the effect of sense of belonging on academic engagement and achievement among ethnic minority students, previous studies have yielded mixed findings. Some studies have discovered that caring classroom environments that facilitate students' sense of belonging can become a protective factor that enhances minority students' academic adjustment (Anderman, 2004). Similarly, Gummadam, Pittman, and Ioffe (2016) found that among college students who identified themselves as ethnic minority, their sense of school belonging was associated with psychological adjustment with reduced depressive symptoms and increased self-worth and self-confidence in their academic and social development, after taking into account individual students' ethnic identity. However, their study revealed that ethnic identity was related to only self-worth when sense of belonging was accounted for, suggesting the relatively powerful influence of sense of belonging over ethnic identity.

By contrast, Hausmann, Schofield, and Woods (2007) compared African American and White first-year students to evaluate if sense of belonging would predict their

commitment and intentions to persist in college. The authors found that sense of belonging, which was defined as a feeling that one is a valued member of and fits in at the college community predicted both institutional commitment and intentions to persist, even controlling for student demographic variables and other predictors of persistence such as degrees of social integration and academic development. Moreover, the study showed that sense of belonging at the beginning of the freshman year had stronger associations with interactions with peer group and faculty, compared to student demographic characteristics.

Taking into account the inconclusive research findings so far, my study aims to elucidate the effect of students' ethnicity on the predictive relationship between sense of belonging and academic engagement. In particular, I hypothesize that whether a student is from an ethnic minority background will moderate the effect of sense of belonging on engagement in the classroom context. That is, for those who identify themselves as members of ethnic minority groups, their sense of belonging will have a stronger effect on their engagement with learning in classroom than students from ethnic majority groups. I test this hypothesis by using multi-group structural equation modeling (SEM) analysis (i.e., ethnic minority versus ethnic majority group).

CRITIQUE OF EMPIRICAL GAPS AND METHODS IN THE EXISTING LITERATURE

Overall, the literature review indicates that prior research has been paying increasing attention to the academic benefits that accrue from perceiving a sense of belonging to a class group. Moreover, researchers have consistently found a positive relationship between sense of classroom belonging and engagement in college classroom

learning. Nevertheless, previous research findings should be viewed with caution due to potential limitations in their methodological approaches.

First, most studies have relied heavily on using retrospective and self-report type of scales to measure students' perceived sense of belonging. In contrast, only a few studies have used qualitative methods such as open-ended surveys and interviews (Booker, 2007). Although a substantial body of research has examined the reliability and validity of the scale that measures individual students' perceived identification with their school or classroom (e.g., Anderman & Freeman, 2004; Freeman et al., 2007; Goodenow, 1993; Van Ryzin et al., 2009), it is imperative for future research to take a more integrative approach and bridge the disconnect between quantitative and qualitative research. Moreover, more efforts are needed to develop systematic and in-depth classroom observations and interviews with students and teachers, which can be used to investigate the antecedents and consequences of sense of classroom belonging.

In addition to these methodological characteristics, previous research leaves open some key questions to be answered for deepening our understanding of the mechanism that underlies the positive influence of sense of belonging on perceived engagement with class activities in college classroom. Specifically, future research should take into consideration the following questions: For which students does sense of belonging or relatedness have greater impact on academic engagement in the classroom? How does the relationship between sense of belonging and engagement develop over time in a classroom community? Can sense of belonging mediate the influence of contextual variables on student

engagement? And how much does the beneficial effect of sense of classroom belonging vary not only across individuals but also within individuals over time and across contexts?

Furthermore, it is pivotal to examine how the chronological development of sense of community in a class can influence, and also be influenced by, the level of students' academic engagement (Watkins, 2005). Some research has investigated the relationship between students' sense of classroom belonging and their engagement across time. For example, Skinner and Belmont (1993) suggested a reciprocal link between student engagement and teacher behavior that promotes sense of belonging (i.e., involvement). They proposed a model positing that teachers modify their behavior toward individual students based on their perceptions of students' behavioral and emotional engagement. Using data collected from elementary schools (Grades 3-5) across the fall and spring semesters of the same school year, Skinner and Belmont found that children who showed higher engagement in fall received more attention and care from teachers later on in the spring, and this increased children's subsequent levels of engagement. Likewise, Van Ryzin et al. (2009) showed that secondary school students who believed their environment to be more supportive of their teacher- and peer-related belongingness needs tended to be more engaged in their learning; and such a pattern was found to hold over time. Nevertheless, further research with a longitudinal research design, particularly in higher education settings, may help substantiate a reciprocal link between general sense of belonging to the class group and classroom engagement.

Also, extant studies call for more research to investigate the effects of class attributes on students' perceived sense of belonging in the classroom as well as their

academic engagement (Anderman & Anderman, 1999; Freeman et al., 2007; Sidelinger & Booth-Butterfield, 2010). Despite the research findings that some course attributes such as class size or instruction method can affect both student sense of classroom belonging and engagement with learning tasks, only a few studies have examined how each of the three constructs would influence one another (Blatchford et al., 2011; Finn et al., 2003). In order to clarify these relationships, future research is needed that would examine to what extent sense of belonging to a class group can mediate between class attributes and classroom engagement. Additionally, considering that larger class settings usually accompany lecture-oriented instruction methods, it may be useful to identify whether there is a significant interaction between class size and instruction method; that is, the effect of class size on engagement may differ depending on whether the class adopted either discussion- or lecture-oriented modes of instruction.

Finally, some researchers have recently emphasized the need for evidence based on the analysis of within-person functioning (i.e., intraindividual relations) in addition to that of between-person covariation (i.e., interindividual relations) (Goetz, Sticca, Pekrun, Murayama, & Elliot, 2016; Linnenbrink-Garcia & Barger, 2014). Goetz et al. (2016) pointed out that although most theories of student learning focus on intraindividual psychological functioning, previous empirical research has typically examined between-person variation. Consequently, the authors argued that there is only little evidence directly supporting the validity of the learning theories underlying these effects. Some of the recommended techniques to capture intra-individual functioning include multilevel multiple regression modeling (e.g., a two-level structure with some variables measured

with different subject domains at Level 1 nested within persons at Level 2) (Goetz et al.,

2016), the experience sampling method (Hektner, Schmidt, & Csikszentmihalyi, 2007),

and analysis of trait versus state fluctuations (Schantz & Conroy, 2009).

Chapter 3: A Pilot Study

STUDY OBJECTIVES, RESEARCH QUESTIONS, AND HYPOTHESES

The existing studies summarized above suggested the need for research that disentangles the complex relations amongst classroom contextual factors, sense of belonging, and academic engagement. Toward this end, I conducted a pilot study during 2016-2017 to understand better the antecedents and consequences of sense of classroom belonging among college students situated in varying course settings. Specifically, using structural equation modeling (SEM), the study tested a two-factor models designed to evaluate whether sense of belonging would predict academic engagement, and to what extent this association would be influenced by course attribute variables such as class size, instruction mode, and reason for taking the course. Additionally, in this pilot study, I examined how well each of the two main latent variables (sense of classroom belonging and academic engagement) can be estimated when using a set of self-report measures.

The pilot study tested three hypotheses to identify the relations among the proposed variables. Hypothesis 1 was that sense of belonging would positively predict academic engagement, holding all course attributes constant. In Hypothesis 2, course attributes were hypothesized to have predictive relations with sense of belonging and academic engagement respectively. Finally, Hypothesis 3 stated that sense of belonging would mediate the effect of course attributes on academic engagement. The hypothesized SEM model is shown in Figure 1.

Figure 1:   Hypothesized SEM Model[1]
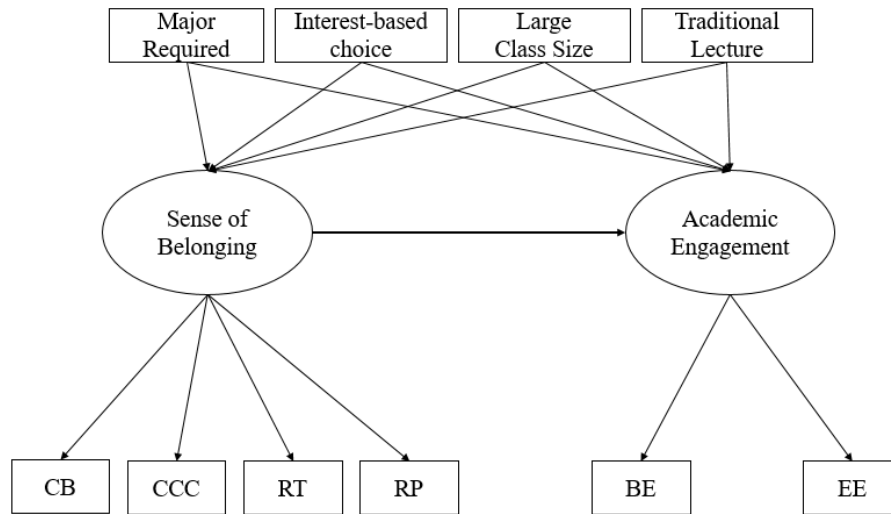
METHOD

Participants and Settings

Participants were 349 undergraduate students (186 women; 163 men) from a large public university in the U.S. southwest, recruited via an online subject pool associated with Educational Psychology courses. Participants came from diverse ethnic and major backgrounds (47% White, 22% Asian/Pacific Islander, 24% Hispanic/Latino; all major colleges of the university represented). Most of the participants' ages ranged from 18 to 24 (98%), with a few between 25 and 34. Among the participants, 43 students (12%) were freshmen and 44 students (13%) were the first in their family to attend a four-year college (i.e., first-generation students).

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[1] Note that residual arrows and covariances were not included for the purpose of simplification.

Participants were asked to complete online survey items in relation to at least three courses they were currently taking. They were allowed to choose these courses and to report on them in the order they chose. In this study, we focused on analyzing data concerning only the first reported course to minimize response bias due to the influence of previous responses on subsequent responses. For approximately 57% of participants, the course was required by their major, and 37% were taking the course because it was of interest to them. Regarding instruction style, 54% reported lecture-based instruction, 19% discussion or small group activity, and 27% mixed. As for class size, 21% were reporting on a course that had 25 or fewer students, and 79% had more than 25 students.

Procedures and Data Sources

To recruit students, I posted a short general description of my study in the subject pool management system and invited interested students to read the electronic consent form. Those who agreed to participate were asked to report demographic information and attributes of three courses they were currently taking. Then, they were asked to self-rate their perceived classroom belonging, connected classroom climate, relatedness to teacher and classmates, and behavioral and emotional engagement with classroom tasks for each course. The online survey was administered at the semester's midpoint during the 2016 fall semester over a two-week period. Prior to data analysis, all collected data were anonymized and checked for completeness. As there were only 17 cases with incomplete responses, these were excluded from further analysis.

Measures

Individual characteristics measure. To collect demographic information, participants were asked to report their age, sex, race or ethnicity identification, and major field of study; whether they were a freshman at the time of survey participation; and whether they were the first in their family to attend a four-year college (i.e., first-generation students). As an indicator of previous academic achievement and merely for purposes of describing the sample, cumulative grade point average (GPA) scores were collected from participants who agreed to provide it.

Once the participants completed the demographic items, they were asked to fill out items about their affiliative motivation in general, in their life. The scale for self-perceived affiliative motivation in one's general life included five items, such as "Being around other people makes me feel better when I feel unhappy or upset." These items were adapted from Wiesenfeld, Raghuram, and Garud (2001), who used a shortened five-item version of the *Interpersonal Orientation Scale* (IOS) (Hill, 1987) to examine the predictive relation between virtual workers' organizational identification and their need for affiliation. Cronbach's alpha for the need for affiliation scale was .84, a sufficiently high value to fulfill the general criteria for internal consistency. Hill's IOS originally consisted of a total of 26 items from four subscales: positive stimulation; attention; social comparison; and emotional support or sympathy. These subscales indicate different incentive dimensions of interpersonal contact. Using data from 1,078 college students, Hill conducted a principal-components factor analysis with oblique rotation (A = 0) and identified four distinct factors corresponding to each interpersonal incentive dimension. Coefficient alphas for the four

subscales ranged from .70 to .86, yielding good evidence for internal consistency reliability. In addition, correlations between the IOS and other personality scales suggested that the IOS can measure a motivational aspect and interest in social contact and that the desire for interpersonal contact should be treated as distinct from social ability.

Course-related measure. A total of four items were used to measure attributes of each reported course, and all were binary coded (0 = No, 1 = Yes). First, participants were asked to indicate whether the course was required by their major or whether they were taking it because of their own interest. Participants' responses about their main reason for taking the course were coded 1 for Yes the course was interest-based.. Next, the dominant mode of instruction item measured whether the course was conducted in a traditional lecture style (0 = No, 1 = Yes). Finally, class size was coded whether the course had more than 25 people in the classroom (0 = small or No, and 1 = Yes or large size). This categorization was based on the general threshold level recommended by previous research in higher education (Cuseo, 2007). At the end of the second-wave survey, participants will be asked to answer three short open-ended questions to reflect on their perceptions about interpersonal relationships, belonging, and engagement with learning tasks in the classroom.

Sense of belonging. Items about participants' sense of belonging in each of their courses were designed to measure their perceptions using the following subscales: *general classroom belonging* (adapted from Goodenow, 1993); *connected classroom climate inventory* (Dwyer et al., 2004); and *relatedness to teacher and to classmates* (Furrer & Skinner, 2003).

The first measure, that of *general classroom belonging,* was developed by Freeman et al. (2007) andincluded ten items such as "I feel like a real part of this class." Freeman and her colleagues adapted Goodenow's (1993) *Psychological Sense of School Membership* (PSSM), originally developed to measure the extent to which middle school students felt they were an accepted, respected, and valued part of school. Their principal components analysis (PCA) with varimax rotation for the class-level items revealed a single general measure of class belonging. In Freeman et al. (2007), the class belonging measure was used to examine associations between college students' subjective sense of belonging at the class level and motivation indicators, and perceptions of teacher characteristics. Cronbach's alpha, or the indicator of internal consistency of this class belonging measure was $\alpha = .90$. The authors mentioned that the reliability estimates reported from previous research that used comparable measures for younger adolescent students ranged between .77 and .88 (Goodenow, 1993b; Goodenow & Grady, 1993).

A second measure of sense of belonging came from the *Connected Classroom Climate Inventory (CCCI),* developed by Dwyer et al. (2004) to measure college students' perceptions of connectedness to a particular classroom. Dwyer and her colleagues defined classroom connectedness as "student-to-student perceptions of a supportive and cooperative communication environment in the university classroom" (p. 267). The CCCI includes 18 items, such as "I feel a sense of security in my class" and "The students in my class show interest in what one another is saying." According to Dwyer et al.'s findings, factor analysis identified a single factor across the eighteen items (i.e., unidimensional), and the unrotated principal component factor loadings ranged from .59 to .83. Cronbach's

alpha for CCCI was α = .94, indicating a high level of reliability. Also, Pearson correlations of scores between CCCI and four global validity items (e.g., I feel connected to other students in my class) were all found to be statistically significant and ranged from .59 to .68, suggesting initial evidence of validity. In addition, when using the CCCI in their study, Sidelinger and Booth-Butterfield (2010) found that college students who perceived greater classroom connectedness tended to show increased involvement in and out of the classroom regardless of the class size.

As a final third and fourth measure of sense of belonging, I measured participants' perceived *relatedness to their teacher and to their classmates* using eight self-report items previously used by Furrer and Skinner (2003). *Relatedness* refers to the degree to which an individual feels important and connected to key social partners. Each of the two subscales consisted of the same four items, incuding "When I'm with my teacher (classmates), I feel ignored" (reverse coded). Furrer and Skinner (2003) showed that there was a moderate correlation between the relatedness to teacher and classmates subscales, and that the reliability coefficient for each subscale was close to .80, indicating high internal consistency. According to their study findings, elementary school students' feelings of relatedness to both teacher and classmates uniquely predicted their self-reported levels of behavioral and emotional engagement.

Academic engagement. Participants' levels of academic engagement was measured by asking them to self-report their behavioral and emotional involvement in classroom activities (Furrer & Skinner, 2003). This scale includes ten items, five items for each of the two engagement subscales. An example item of behavioral engagement is "I

try hard to do well in this classroom," and that of emotional engagement "When I'm in this classroom, I feel good." Participants were asked to respond to these items on a 5-point Likert scale to indicate the degree to which each statement was true of them (1 = not at all, 2 = slightly, 3 = moderately, 4 = very, 5 = completely). The scores on the self-rating items within each scale were averaged to indicate the overall score.

As evidence for reliability, Furrer and Skinner (2003) found sufficient levels of Cronbach's alpha in each student-reported engagement subscale: behavioral engagement (α = .75) and emotional engagement (α = .86). In addition to the students' self-ratings of their own engagement, Furrer and Skinner used teacher-provided reports of student engagement and found acceptable levels of internal consistency in each subscale: behavioral engagement (α = .91) and emotional engagement (α = .90). Their findings also provided evidence for test-retest reliability by showing that the correlation between student reports of total engagement in fall and spring was high for both student reports (r = .76) and teacher reports (r = .77). Moreover, teacher and student reports of engagement were moderately correlated (r = .39), supporting inter-rater reliability and construct-related validity between teacher and student reports. Although this measure has been used frequently in the elementary through high school context, previous research has suggested that the Engagement with Learning scale is a reliable and valid measurement instrument (Skinner et al., 2008).

Data Analysis

A structural equation modeling (SEM) approach was used to test the proposed three hypotheses regarding the relations among college students' sense of belonging, academic engagement, and course attribute variables. Data were fitted to the hypothesized SEM model using M*plus* 7.4 (Muthén & Muthén, 1998-2015) (see Figure 1).

Participants on average reported between three (Moderately) and four (Very) on the four subscales of sense of belonging (i.e., CB, CCC, RT, RP) and the two subscales of academic engagement (i.e., BE, EE) (see Table 1). Bivariate correlations were calculated among the sense of belonging subscales, academic engagement subscales, and measures of course attributes (see Table 2).

Table 1:   Means, Standard Deviations, and Cronbach's Alphas of Measures[2]

Measures (Sample Items)	M	SD	Cronbach's Alpha
Classroom Belonging (CB) "*I feel like a real part of this class*"	3.74	.68	.85
Connected Classroom Climate (CCC) "*The students in my class show interest in what one another is saying*"	3.30	.73	.94
Relatedness to Teacher (RT) "*When I'm with my teacher, I feel accepted*"	3.89	.79	.79
Relatedness to Peers (RP) "*When I'm with my classmates, I feel accepted*"	3.73	.66	.70
Behavioral Engagement (BE) "*I try hard to do well in class*"	3.51	.79	.82
Emotional Engagement (EE) "*When I'm in class, I feel good*"	3.36	.98	.91

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[2] All on a scale from 1 to 5 (1 = not at all, 2 = slightly, 3 = moderately, 4 = very, 5 = completely).

Table 2:   Bivariate Correlations among Measures[3]

Measures	1	2	3	4	5	6	7	8	9	10
1. Major Required	—									
2. Interest-based Choice	-.53**	—								
3. Traditional Lecture	.16**	-.13*	—							
4. Large Class Size	.01	-.05	.42**	—						
5. Classroom Belonging	-.15**	.20**	-.16**	-.25**	—					
6. Connected Classroom Climate	-.15**	.17**	-.17**	-.23**	.72**	—				
7. Relatedness to Teacher	-.12*	.16**	-.09	-.18**	.67**	.58**	—			
8. Relatedness to Peers	-.11*	.10	-.10	-.22**	.73**	.74**	.60**	—		
9. Behavioral Engagement	.03	.01	-.08	-.18**	.50**	.48**	.38**	.36**	—	
10. Emotional Engagement	-.22**	.36**	-.14**	-.15**	.66**	.63**	.56**	.53**	.60**	—

RESULTS

Initial analysis of the SEM model indicated modification indices that were greater than 3.84 for the covariance parameter between CCC and RP. The model was respecified based on the theoretical assumption that both measures focused on assessing perceptions of peers' behaviors and attitudes. SEM analysis revealed that the model chi-square (χ^2) test statistic was significant, $\chi^2 (33) = 81.661$ with $p < .001$. However, because the model χ^2 test statistic is sensitive to sample size, other fit indices were simultaneously considered to evaluate goodness of the model fit. All other fit indices fell into acceptable criteria (Schreiber, Nora, Stage, Barlow, & King, 2006), indicating that the hypothesized SEM model fitted the data fairly well (CFI = 0.959, SRMR = 0.037, and RMSEA = 0.078 with a 90% confidence interval between 0.047 and 0.083). The results from the tested SEM model are shown in Figure 2.

[3] *$p < .05$. **$p < .01$.

In terms of Hypothesis 1, results showed that sense of belong was significantly predictive of greater academic engagement (β = .72, p < .05), thereby confirming the hypothesized relationship. That is, there was a .72 standard deviation unit increase in academic engagement as sense of belonging increased by one standard deviation. Further, as shown in Figure 2, the estimated factor loadings for the two latent constructs, sense of belonging and academic engagement, were significant and ranged from .61 to .98, suggesting that the proposed subscale measures might reflect each construct sufficiently well. In particular, the SEM analysis indicated that not only the classroom belonging measure alone but also measures of perceived student-to-student communication behaviors and relatedness with teacher and classmates all contributed to explaining the construct of sense of belonging.

Hypothesis 2 tested the extent to which course attributes would predict sense of belonging and academic engagement respectively. Testing multicollinearity of all four given course attributes showed acceptable levels of indicators, a VIF value of 10 or less. Among the four course attributes, class size and reason for course choice were found to have significant predictive association with sense of belonging. Specifically, results indicated that a large class size was a negative predictor (β = -.26, p < .05) whereas interest-based course choice was a positive predictor for sense of belonging (β = .14, p < .05). In terms of academic engagement, only interest-based course choice was a significant and positive predictor as expected (β = .22, p < .05). However, whether the course was required for the student's major or whether it was conducted in traditional lecture format did not significantly predict either academic engagement or sense of belonging.

Finally, regarding Hypothesis 3, results supported the hypothesized indirect effects of some course attributes on academic engagement through sense of belonging (see Table 3). Results indicated that sense of belonging fully mediated the relationship between large class size and academic engagement. Class size had no direct effect on academic engagement whereas the indirect effects from class size to academic engagement was significant. Also, sense of belonging was found to mediate partially the effect of interest-based choice on academic engagement. These findings suggest that large class size and interest-based course choice each might change participants' sense of belonging, which subsequently could affect their academic engagement.

Figure 2:   Tested SEM Model with Standardized Parameter Estimates[4]

| Major Required | Interest-based choice | Large Class Size | Traditional Lecture |

.14**   .22***
        -.26***

Sense of Belonging   .72***   Academic Engagement

.90***   .80***   .74***   .80***   .61***   .97***

| CB | CCC | RT | RP | | BE | EE |

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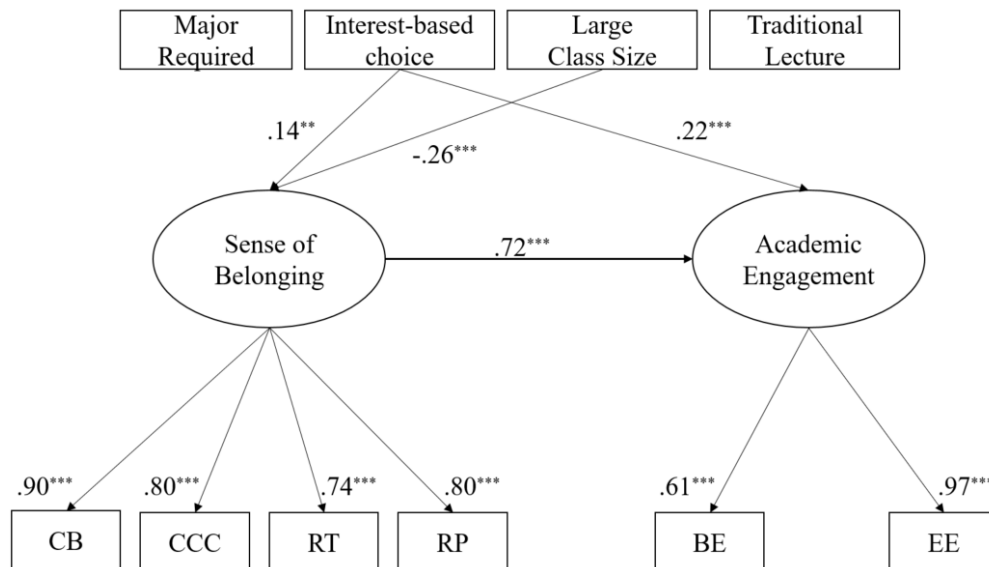
[4] Only significant path coefficients were presented. **$p < .01$. ***$p < .001$.

Table 3:   Standardized Indirect Effects Decomposition of the Structural Model[5]

Path	Indirect Effect	S.E.
Large Class Size → Sense of Belonging → Academic Engagement	-.19**	.05
Interest-based Choice → Sense of Belonging → Academic Engagement	.10*	.04

DISCUSSION

Overall, preliminary findings from my pilot study underscore the positive link between sense of belonging and engagement with learning in college classroom settings. Results showed that feelings of belonging, or feeling accepted and connected to the classroom community, have beneficial effects on engagement with learning tasks in the classroom. This study also contributes to deepening our understanding of the theoretical model of sense of belonging and academic engagement in the college classroom. Through SEM analysis, the study examined the concept of sense of belonging with an integrative approach and yielded evidence supporting previous research findings. Moreover, the pilot study helped identify the mechanism by which some course attributes could influence academic engagement through their connection to sense of belonging. in particular, results from the mediation test suggested that sense of classroom belonging might explain the underlying mechanism of the negative effect of large class size on academic engagement, thereby contributing to resolving the current debate on the effect of class size on student learning processes.

However, the pilot study had several limitations. First, data were collected only at a single time point, and therefore results did not fully capture intra-individual changes over

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[5] Significant paths only. *$p < .05$. **$p < .01$.

time in students' perceptions of sense of belonging and academic engagement. As these constructs are situational and responsive to contextual factors, longitudinal research designs would be better approach in testing the associations among these constructs (Goetz et al., 2016). Second, the pilot study used measures of only behavioral and emotional dimensions of academic engagement, although the literature is increasingly pointing to the importance of the cognitive dimension of engagement (Appleton et al., 2008). Additionally, in data analysis, I used samples that aggregated participants' ethnicity backgrounds. Therefore, it is still unclear whether the proposed theoretical model would apply to students from different ethnic or racial groups, and therefore calling for testing group differences.

Taken together, more empirical investigation is needed to fill the remaining research gaps pointed out in the literature review. Informed by the aforementioned limitations of my pilot study, I posed further research questions along with a revised SEM model for my main research project. In the next chapter, I continue to explain the goal and method of my main study and discuss results and implications from data analysis.

Chapter 4: Main Study

STUDY OBJECTIVES, RESEARCH QUESTIONS, AND HYPOTHESES

Considering the aforementioned research gaps in the existing literature, I designed this study to contribute to clarifying how college students' sense of belonging in one of the courses they are currently taking is associated with the development of their academic engagement in the course over the period of a semester. In this short-term longitudinal study, data were collected at two different time points across the semester. The design of the study also aimed to examine the potential contribution of some course attribute variables either to facilitating or thwarting students' sense of classroom belonging. Additionally, I sought to understand the role of students' demographic characteristics as moderators between sense of classroom belonging and academic engagement. Using structural equation modeling (SEM), I posed three main research questions and tests of related hypotheses. Figure 1 shows the hypothesized SEM model in which measures at the beginning and toward the end of the semester (Time 1 and Time 2) were hypothesized to show significant associations. Specific research questions were as follows:

1. How is sense of classroom belonging related to academic engagement, and how does this relation change over time?

2. How may course attribute variables influence students' sense of classroom belonging and subsequently their academic engagement in the classroom?

3. To what extent does the hypothesized SEM model apply to both ethnic/racial minorities and non-minority groups?

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The first question was concerned with how sense of classroom belonging would predict academic engagement, and how this predictive relation might change over a semester period. I tested whether sense of belonging had generally positive predictive relations with engagement at each time point. Given that some researchers have suggested that perceived belongingness and engagement in classroom learning can mutually influence each other (Furrer & Skinner, 2003; Zumbrunn et al., 2014), I also examined whether there was a reciprocal relationship between academic engagement and sense of classroom belonging across the semester. Additionally, in order to estimate more accurately the amount of contribution that students' sense of belonging can make to predicting their levels of engagement, I statistically controlled for the effects of academic motivation variables such as self-efficacy and task value on academic engagement. This was done by adding to the SEM model parameters that estimated the effects of these motivation variables. A total of three hypotheses were tested for the first research question:

Hypothesis 1a: Sense of classroom belonging at Time 1 predicts academic engagement at Time 1, holding self-efficacy and task value constant.

Hypothesis 1b: Sense of classroom belonging at Time 1 predicts changes in academic engagement at Time 2, after controlling for academic engagement at Time 1.

Hypothesis 1c: Academic engagement at Time 1 mediates between sense of classroom belonging at Time 1 and sense of classroom belonging at Time 2.

The second question dealt with how class size, instruction style, and classroom goal structure of a college course may predict students' sense of classroom belonging and

subsequently their academic engagement in the classroom. In particular, I tested whether large class sizes, predominantly lecture-based instruction mode, and performance goal orientations in the classroom negatively shaped students' perceptions about belonging. I further examined the extent to which each course attribute variable had indirect effects on students' levels of engagement, mediated by their sense of classroom belonging. For the second question, two hypotheses were tested as follows:

Hypothesis 2a: Each course attribute predicts sense of classroom belonging at Time 1, and indirectly predicts sense of classroom belonging at Time 2 through academic engagement at Time 1.

Hypothesis 2b: Each course attribute indirectly predicts academic engagement at Time 1 and Time 2.

Finally, the third question examined the extent to which the hypothesized SEM model applied to both ethnic/racial minorities and non-minority groups. Multigroup SEM analysis was conducted to test for structural invariance across groups and to determine whether there existed any significant group differences in the model. I was particularly interested in examining whether the effect of sense of belonging was statistically significant for both sub-groups and for which sub-group the effect was stronger.

Figure 3:   A Hypothesized SEM Model

(Contextual) course attribute variables

| Class size | Instruction style | Classroom goal structure |

Intra-personal factors

| Self-efficacy | Task value |

Belonging Time 1

Belonging Time 2

Engagement Time 1

Engagement Time 2

Sense of classroom belonging

Academic engagement in class
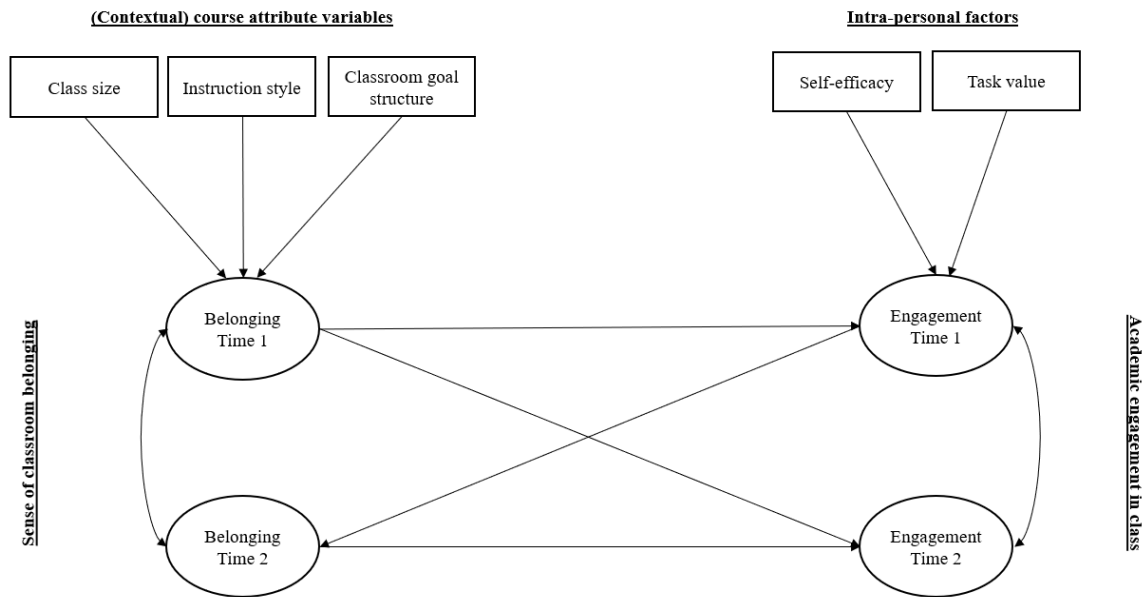
METHOD

Participants and Settings

Participants were 295 undergraduate students from the same public university as in my previous pilot study, which is located in a southwestern state of the United States of America. Participants were recruited in Fall 2017 and Spring 2018 semesters via the online subject pool that was associated with undergraduate courses offered through the department of Educational Psychology (EDP). Students who were enrolled in such courses were required to participate in the subject pool to fulfill a course completion requirement. Using this convenience sample provided relatively easy access to students representative of the population of interest, namely college students attending a large university. The difference between those who were registered for subject pool-related courses and those

who were not is assumed to be minimal in terms of their demographic background, years in college, and past academic achievement.

Demographic data showed that 92% of the participants' ages ranged between 18 to 24, and that women comprised 73% of total participants. Participants represented diverse ethnicities, with 46% White/European American, 24% Asian/Pacific Islander, 23% Hispanic or Latino, 4% Black/African American, and 3% Other. Of all participants, 85% indicated that they were native speakers of English, 8% were of Spanish language origin, 99 students (34%) identified as first-generation students. Participants also came from various major fields of study, with only 30 students (10%) reporting that they were freshmen at the time of research participation.

Participants were asked to respond to online survey items in relation to one of their undergraduate courses, choosing from those courses they were taking in the current semester the course that had a subject pool requirement. Each participant was expected to report on one of the six subject pool related courses, all of which are provided in EDP. One such course covers learning strategies for college success; four courses focus on human development; and the remaining course is an introductory-level statistics course. Participants were asked to report the estimated number of students taking the same course in the section, and to indicate a dominant instruction style in their respective course, choosing from lecture-based, discussion or seminar, or mixed. Participants were also asked to choose one response option that corresponded to their main reason for taking the course (e.g., it was required by their major or out of their own interest).

Table 4 shows some key descriptive information about each subject pool related course in the past three academic years, which informed the research design and data collection for this project. Most courses were conducted by one or two instructors, except one course that had between six or seven instructors. Three of the courses provided one or two sections, whereas the other three courses offered three or more sections. Average numbers of class sizes across courses varied, ranging from 24 to 129 students enrolled in each section. Average course ratings as measured by the 'Overall, the course was' item on a 5-point Likert scale (1 = *Very unsatisfactory*, 2 = *Unsatisfactory*, 3 = *Satisfactory*, 4 = *Very good*, and 5 = *Excellent)* ranged between 3.3 and 4.7. Although all six courses had been generally rated as at least satisfactory, it is important to note that results from course ratings may not represent the entire student population due to low response rates and consequently potential sample bias.

Data showed that 43% of total participants were enrolled in Course 5 (Human Sexuality), 23% in Course 6 (Introduction to Statistics), 12% in Course 1 (Strategic Learning for 21st Century), 9% each in Course 2 (Human Sexuality & Relationships) and Course 4 (Adolescent Development), and 5% in Course 3 (Introduction to Life Span Development). Of the total respondents, 13% estimated that there were 25 or fewer students in their chosen course, 21% between 26 and 59 students, 33% between 60 and 100 students, and the remaining 34% more than 100 students in their class. Courses with 60 or more students in the classroom were categorized as having relatively large class size, which was binary-coded for the subsequent SEM analysis. In terms of dominant instruction mode, 41% of participants reported that their course was lecture-oriented, 43% that it was a mix of

lecture and discussion, and 16% discussion-oriented or other. As for the main reason for taking the course, 54% of participants chose *because I am interested in the subject*, 31% *because this class is required*, and the rest, 15%, *because it will be necessary for my future* or *Other*. Finally, 76% of participants reported that their chosen courses were required to be taken for their major.

Also, at Time 2 during Spring 2018, participants were given two additional survey questions that asked about their perceptions of the class size (i.e., number of students in the classroom) and course activities. First, participants were asked to choose one of the three given categories (i.e., small, medium, and large) that they thought would characterize the size of their chosen class. Table 5 compares the actual class sizes (in average) and the distribution of participants' perceived class size characteristics for each of the six courses. Interestingly, regarding courses with between 55 and 60 students in class (i.e., Courses 3, 4, and 6), participants' perceptions were most mixed, ranging from small, medium, to large.

Next, participants were asked to indicate how often their chosen course had involved them in small-group discussion or other group work. Their responses were compared to their choice of primary mode of instruction at the beginning of the semester (see Table 6). Results suggested that participants' chosen mode of instruction generally corresponded to their perceptions of how often they had participated in small-group activities in the course. For example, the majority of participants who chose lecture-oriented as primary mode of instruction reported that their course had involved them in small-group activities either rarely or occasionally (61%).

Table 4:   EDP Subject Pool Course Information[6]

Course Variables	Course Name	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018
Number of instructors (Number of classes)	Course 1: Strategic Learning for the 21st Century	6 (8)	7 (9)	7 (8)	7 (9)	7 (8)	7 (8)
	Course 2: Human Sexuality & Relationships	1 (1)	1 (1)	2 (2)	1 (1)	1 (1)	1 (1)
	Course 3: Introduction to Life Span Development	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
	Course 4: Adolescent Development	1 (1)	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)
	Course 5: Human Sexuality	2 (5)	2 (5)	2 (5)	2 (5)	3 (6)	2 (5)
	Course 6: Introduction to Statistics	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)	2 (3)
Average number of class size	Course 1	25	24	27	27	28	27
	Course 2	129	128	129	127	124	120
	Course 3	33	51	48	49	52	59
	Course 4	30	35	38	35	31	60
	Course 5	129	128	129	127	123	124
	Course 6	62	62	64	98	83	55
Average course ratings	Course 1	4.2	4.4	4.3	4.4	4.3	4.4
	Course 2	4.5	4.4	4.5	4.5	4.2	4.4
	Course 3	4.3	4.5	4.7	4.6	4.3	4.0
	Course 4	3.3	4.0	4.0	3.4	4.1	4.4
	Course 5	4.4	4.4	4.5	4.5	4.5	4.7
	Course 6	4.4	4.3	4.2	4.2	4.0	4.2

Table 5:   Perceived Class Size by EDP Subject Pool Course

EDP Subject Pool Course (Spring 2018 only)	Avg. Class size	How would you characterize the size of this class?			Total
		Small	Medium	Large	
Course 1	27	6	3	0	9
Course 2	120	0	7	4	11
Course 3	59	1	7	0	8
Course 4	60	4	10	3	17
Course 5	124	0	24	21	45
Course 6	55	3	7	3	13
Total		31	58	14	103

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[6] Data sources for my research project came from the semesters of Fall 2017 and Spring 2018.

Table 6:   Choice of Instruction Mode and Perceptions of Course Activities

Choice of Instruction mode (Spring 2018 only)	How often does this course involve you in small-group discussion or other group work?					Total
	Rarely	Occasionally	Often	Somewhat often	Very often	
Lecture-oriented	12	15	5	10	2	44
Discussion-oriented	0	1	1	2	0	4
Mix of lecture and discussion or Other	8	15	16	11	4	54
Total	20	31	22	23	6	102

Procedures and Data Sources

Data were collected from participants' responses to an anonymous online survey, which was administered during the 2017 fall and 2018 spring semesters at two different time points within each semester. The reference time points were approximately at one-third (Time 1) and two-thirds (Time 2) of the semester across a 15-week-semester. Upon obtaining research approval from the IRB and subsequently from the EDP subject pool, I invited interested students to open a *Qualtrics* link via the subject pool website and to read the electronic consent form. Potential participants chose to volunteer to continue in the study or not, after they had fully reviewed the study information (e.g., research purpose, requirements, consequences, and rights and responsibilities as a participant) on the computer or mobile phone screen. As a consequence of research participation, each participant earned one and a half credits out of five total credits that were needed to fulfill their subject pool requirement. Participants did not receive any monetary compensation for their participation in this study. A total of 295 participants were recruited from the subject pool, 192 from Fall 2017 and 103 from Spring 2018. The number of participants was sufficient enough to perform the SEM analysis, given that 10 samples per path are generally

recommended to test a hypothesized SEM model (Schreiber, Nora, Stage, Barlow, & King, 2006).

Those who agreed to participate were required to respond to every item and prevented from skipping any of them. For several sensitive items such as those asking about GPA, a response option that read "I refuse to answer" was included. At Time 1, participants were asked to report their demographic information and to respond to a measure of affiliative motivation in their daily lives, data that served as sets of covariate information. Then, they were asked to report classroom features in one of the subject pool courses in which they were currently enrolled. Once they completed reporting on the course information, they were asked to self-rate their sense of belonging to the chosen classroom group as well as their motivation and engagement with learning in relation to the course. Participants' sense of classroom belonging and academic motivation and engagement were measured both at Time 1 and Time 2. Prior to data analysis, all collected data were anonymized and checked for completeness. Participants' identifiers (e.g., email addresses) were separated from their responses and were destroyed upon completion of the study.

Measures

The online survey consisted of a total of 103 items delivered in seven sections: demographic information (8 items); course attributes (7 items); self-ratings of classroom goal structure (10 items), general affiliative motivation (12 items), academic motivation (10 items), sense of classroom belonging (36 items), and engagement with learning in the classroom (20 items). Participants were asked to respond to the self-rating items on a 5-

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point Likert scale to indicate the degree to which they considered each statement true of them (1 = *not at all*, 2 = *slightly*, 3 = *moderately*, 4 = *very*, 5 = *completely*). The estimated amount of time needed to finish the survey was between 30 and 40 minutes. Participants' demographic information, course attributes, self-ratings of classroom goal structure, academic motivation, and their general affiliative motivation were measured only at Time 1. At Time 2, the survey repeated items from the sense of classroom belonging and engagement subscales. The survey also newly included three short open-ended questions that asked participants' perceptions about how their interactions with teacher and classmates and sense of belonging influenced their class participation and engagement.

The online survey for the present research project adopted most of the same survey items that had already been used and tested in my pilot study, including those from the individual characteristics measure, course-related measure, sense of belonging subscales, and academic engagement – behavioral and emotional (see Chapter 3). Additionally, as explained in the research questions and proposed SEM model (see Figure 3), this project used new survey items that measured students' perceived academic motivation, classroom goal structure, and cognitive engagement. The full set of items for each scale is attached in the Appendix.

Individual characteristics measure. This measure consisted of questions that were designed to collect participants' demographic information such as age, sex, race or ethnicity origin, current GPA, and major field of study, whether they were a freshman at the time of survey participation, and whether they were the first in their family to attend a

four-year college. The measure also included items that asked participants to report their self-perceived affiliative motivation and general need for relatedness in their daily lives.

Course-related measures. Participants were asked to identify one of their chosen Educational Psychology department courses that had a subject pool requirement, and then to report course features, including: course topic and schedule, dominant mode of instruction, whether the course was required by their major, a main reason for taking the course, approximate number of students in the class (i.e., class size), and approximate number of students that each participant already knew before the semester. In the survey that was administered during the Spring 2018 semester, participants were asked to indicate (1) how often the course involved them in small-group discussion or other group work and (2) how they would characterize their class size (e.g., small, medium, large). These items were included to explore whether there was any potential discrepancy between students' perceptions and the actual class size and instruction mode.

Additionally, participants' perceived classroom goal structure, as another aspect of course attributes, was measured by using the Patterns of Adaptive Learning Survey (PALS) (Midgley, 2002). The classroom goal structure scale in the PALS assesses students' perceptions of their teacher's classroom practices regarding whether these reflect either mastery-oriented or performance-oriented goals. The mastery goal subscale includes five items asking whether the teacher emphasizes learning or the task itself, such as "My teacher really wants us to enjoy learning new things." On the other hand, the performance goal subscale consists of six items asking whether the instructional practices focus on demonstrating good grades or doing better than others. An example item is "My teacher

lets us know who gets the highest scores on a test." The PALS classroom goal structure subscales have been widely used in previous research and shown to have high internal consistency with Cronbach α greater than .70 (Midgley, 2002; Wolters, 2004). Although prior research suggests that classroom goal structures can be distinguished from personal goal orientations, researchers have argued that different classroom goal structures predict students' personal goal orientations and subsequently influence their motivation and learning process (Ames & Archer, 1988; Meece et al., 2006; Wolters, 2004). For example, Anderman and Anderman (1999) showed that increased perceptions of performance-oriented goal structures in the classroom were negatively related to sense of school belonging during the transition to middle school.

Sense of classroom belonging. Next, participants completed items from four sets of scales, which were designed to measure individual students' self-perceived sense of belonging to a certain classroom group. These four sub-component measures of sense of classroom belonging included: *general classroom belonging, relatedness to teacher, relatedness to classmates*, and *connected classroom climate inventory*. Items from each scale were given in a random order in the online survey. Detailed measurement information such as reliability and validity of each subscale was provided in the previous chapter describing my pilot study.

Academic motivation. Participants were asked to complete 10 items in which they self-reported their academic motivation in relation to the chosen EDP course. The academic motivation scale was adapted from the Self-Efficacy for Learning and Performance and Task Value subscales of the Motivated Strategies for Learning Questionnaire (MSLQ)

(Pintrich & De Groot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993). The MSLQ, a measure that has been widely utilized in prior research, consists of 81 self-report items, including a set of motivation items (31 items) and another set of cognitive and metacognitive strategy items (50 items). The Self-Efficacy subscale was designed to measure students' judgements of their own ability to master academic tasks and be successful in the course (e.g., I believe I will receive an excellent grade in this class). The Task Value subscale measures students' perceived interest, importance, and usefulness regarding course-related tasks or materials (e.g., It is important for me to learn the course material in this class).

Pintrich et al. (1993) conducted a set of statistical analyses to test reliability and validity of the MSLQ, using data gathered from 380 college students across various subject domains. In terms of reliability, the authors found robust and high internal consistency for each of the two motivation subscales: the Self-Efficacy subscale with α = .93 and the Task Value subscale with α = .90. Also, their findings showed that both motivation subscales had expected positive correlations with students' final course grades (r = .41 for the Self-Efficacy subscale and r = .22 for the Task Value subscale), indicating reasonable predictive validity. Additionally, previous research has also shown positive and strong relations between sense of classroom belonging and academic motivation indicated by self-efficacy and task value measures, which were of key interest in my study (e.g., Freeman et al., 2007; Zumbrunn et al., 2014).

Academic engagement. Finally, participants' levels of academic engagement were measured by asking them to self-report on behavioral, emotional, and cognitive aspects of

their engagement with classroom learning tasks. Items for behavioral and emotional engagement were the same as those items that were used in the pilot study. In terms of cognitive engagement, a total of 10 items were used, which were adapted from the *Cognitive Strategy Use* and *Self-Regulation* subscales in the MSLQ (Pintrich & De Groot, 1990). The Cognitive Strategy Use subscale originally consisted of 13 items that were designed to measure students' use of various cognitive strategies, including rehearsal (e.g., When I read material for this class, I say the words over and over to myself to help me remember), elaboration (e.g., When I study I put important ideas into my own words), and organization (e.g., I outline the chapters in my book to help me study). The Self-Regulation subscale contained 9 items that reflected metacognitive and effort management strategies. Metacognitive strategies included planning, skimming, and comprehension monitoring (e.g., I ask myself questions to make sure I know the material I have been studying); whereas effort management strategies included showing persistence in the face of difficult or boring tasks (e.g., Even when study materials are dull and uninteresting, I keep working until I finish). Overall, Pintrich and Degroot showed that both MSLQ subscales were sufficiently reliable: $\alpha = .83$ for the Cognitive Strategy Use subscale and $\alpha = .74$ for the Self-Regulation subscale. Moreover, previous research has frequently used the two subscales as indicators of cognitive engagement among a wide range of students, and results have supported that these could serve as a valid measure explaining close associations with students' academic motivation and achievement (e.g., Linnenbrink & Pintrich, 2003; Fredericks et al., 2004).

Data Analysis

This study used two types of data analysis, including descriptive analysis and structural equation modeling (SEM). Descriptive analysis was performed prior to SEM, which was the primary method to test the hypotheses related to the given research questions. For every test of significance, an alpha level of .05 was used.

First, the purpose of descriptive analysis was to describe participants' demographic and course information as well as their responses to each survey item. By using basic descriptive statistics, this study examined characteristics of participants' self-reported demographic information, including their age, gender, race/ethnicity origin, major field of study, freshman status, and first-generation status. The means and standard deviations were calculated for all measures of individual characteristics and course attributes. According to the descriptive statistics reported in Table 7, participants on average chose between 3=Moderately True and 4=Very True on most self-rating items. Next, bivariate correlations were computed to describe linear relations between the measured variables, once it was verified that the collected data met the assumptions for use of Pearson's correlation coefficient *r*, or standardized covariance (e.g., independent observations of bivariate variables; homoscedasticity of errors). Specifically, the magnitude, direction, and statistical significance of correlation coefficients were examined among course attribute measures including class size (i.e., whether the class size was relatively large), instruction mode (i.e., whether the course was conducted with a traditional lecture-oriented instruction mode), classroom goal structure (i.e., degree of mastery-oriented goal structure), and self-

ratings of sense of classroom belonging as well as academic motivation and engagement (see Table 8).

Table 7:   Means, Standard Deviations, and Cronbach's Alphas of Measures

Variable name	Measure	Time Point	Mean	S.D.	Cronbach's Alpha
Course attribute	Mastery classroom goal structure	1	3.99	.69	.81
Intrapersonal	Self-efficacy	1	4.04	.81	.94
	Task value	1	3.74	.97	.90
Sense of classroom belonging	General classroom belonging	1	3.88	.65	.83
		2	3.92	.70	.86
	Relatedness to teacher	1	4.07	.64	.68
		2	4.07	.71	.72
	Relatedness to classmates	1	3.81	.75	.76
		2	3.89	.76	.74
	Connected classroom climate	1	3.37	.76	.95
		2	3.49	.84	.96
Academic engagement	Behavioral engagement	1	3.89	.71	.77
		2	3.79	.82	.83
	Emotional engagement	1	3.63	.88	.89
		2	3.63	.93	.91
	Cognitive engagement	1	3.53	.65	.80
		2	3.57	.74	.87

Table 8:   Bivariate Correlations among Key Variables[7]

	Lctr	Lg Clss	MGS	SE	TV	GCB1	RT1	RC1	CCC1	BE1	EE1	CE1	GCB2	RT2	RC2	CCC2	BE2	EE2	CE2
Lctr	1																		
LgClss	.03	1																	
MGS	-.21**	-.08	1																
SE	-.06	-.08	.34**	1															
TV	-.14*	-.12*	.37**	.44**	1														
GCB1	-.23**	-.13*	.61**	.36**	.50**	1													
RT1	-.13*	-.15**	.56**	.20**	.29**	.65**	1												
RC1	-.17**	-.07	.42**	.21**	.30**	.72**	.63**	1											
CCC1	-.22**	-.02	.53**	.34**	.42**	.73**	.53**	.63**	1										
BE1	-.06	-.02	.24**	.26**	.37**	.38**	.20**	.32**	.27**	1									
EE1	-.08	.01	.49**	.42**	.59**	.67**	.43**	.48**	.62**	.53**	1								
CE1	-.06	-.09	.30**	.25**	.38**	.37**	.30**	.37**	.33**	.55**	.40**	1							
GCB2	-.19**	-.12*	.49**	.28**	.47**	.72**	.48**	.54**	.58**	.29**	.55**	.29**	1						
RT2	-.15*	-.17**	.47**	.25**	.35**	.62**	.60**	.47**	.52**	.13*	.47**	.17**	.71**	1					
RC2	-.11	-.08	.35**	.23**	.33**	.65**	.45**	.62**	.60**	.24**	.45**	.23**	.78**	.66**	1				
CCC2	-.15*	-.04	.46**	.33**	.38**	.61**	.42**	.49**	.72**	.20**	.45**	.24**	.73**	.56**	.72**	1			
BE2	.001	.03	.26**	.18**	.26**	.34**	.17**	.22**	.25**	.63**	.40**	.45**	.45**	.28**	.37**	.41**	1		
EE2	-.12*	.05	.40**	.34**	.52**	.55**	.30**	.33**	.44**	.42**	.67**	.31**	.69**	.54**	.55**	.62**	.64**	1	
CE2	-.02	-.02	.22**	.13*	.30**	.31**	.19**	.27**	.25**	.46**	.31**	.62**	.43**	.25**	.32**	.39**	.64**	.50**	1

Additionally, for the purpose of testing between-course differences in participants' engagement with classroom learning, students' mean scores on each academic engagement subscale were compared through one-way ANOVA test statistics. There was a significant effect of course on participants' levels of behavioral engagement at Time 1 [$F(5, 287) = 3.12$, $p < .01$] and at Time 2 [$F(5, 287) = 3.74$, $p < .01$] as well as those of emotional engagement at Time 1 [$F(5, 287) = 6.40$, $p < .001$] and at Time 2 [$F(5, 287) = 8.51$, $p < .001$]. Tukey HSD post hoc test revealed that participants who were enrolled in Course 1 reported higher levels of behavioral engagement at Time 1 than those in Course 3;

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[7] 1 indicates that the measurement took place at *Time 1*; and 2 at *Time 2*.

whereas those from Course 3 reported lower levels of behavioral engagement at Time 2 than those from Course 1 and Course 5. In terms of emotional engagement, participants from Course 6 reported lower levels at Time 1 than those from Courses 1, 2, and 5; and those from Course 6 reported lower levels again at Time 2, compared to those from Course 1 and Course 2. Despite the existence of between-course differences in participants' scores of behavioral and emotional engagement across the semester, the course effect appeared to be relatively inconsistent across the three aspects of engagement (i.e., behavioral, emotional, cognitive). Even though participants from Course 1 tended to report higher levels of behavioral and emotional engagement across times, the sample size (n = 35) was not large enough to capture a group effect in the SEM model. Therefore, the course variable was not included in subsequent SEM analysis.

Before conducting t-test and ANOVA analyses, I tested whether the collected data met a set of assumptions for such analyses. For example, when skewness/kurtosis and Kolmogorov-Smirnov test statistics were measured against the null hypothesis that the data were normally distributed, results suggested that the data fulfilled the normality assumption. Also, Quantile-Quantile (Q-Q) plots for each variable revealed that observed data points generally lay more or less on the line of expected normal values, and therefore there was no substantial outlier. Further, the data fulfilled other important assumptions such as homoscedasticity, independence, and normality of residuals, thereby contributing to maximizing the valid interpretation of regression coefficients. Additionally, the existence of multicollinearity, which refers to high dependency among the predictors, was tested to diminish the standard errors associated with each regression coefficient by using variance

inflation factor (VIF; greater than 10) statistics. The test did not indicate any serious problems—the VIF was 10 or less for all variables. Measurement error in each variable was assessed by its internal consistency (i.e., Cronbach's alpha) value.

Finally, structural equation modeling (SEM) analysis was carried out in order to test goodness of fit of the proposed model as well as the proposed hypotheses for each research question. SEM refers to a statistical technique that reflects the combination of confirmatory factor analysis (CFA) and multiple regression. It analyzes the relations among not only observed variables (i.e., measures) but also unobserved ones (i.e., constructs). In other words, SEM allows researchers to capture the complex nature of unobservable, or latent, constructs such as sense of belonging, and academic engagement. This attribute of SEM analysis contrasts with that of path analysis, which uses only a single indicator to estimate a variable of interest. Indeed, researchers have suggested that SEM is useful in education research that often deals with variables that are not directly observable (Schreiber et al., 2006). Moreover, SEM was suitable for this longitudinal study as it took into account the interrelation between the residuals, or errors, in the same variables that were measured at different time points for each individual participant (Schreiber et al., 2006).

Collected data were fitted to the hypothesized SEM model by using the Mplus 7.4 statistical modeling program (Muthén & Muthén, 1998-2015). In terms of the parameter estimation method, maximum likelihood (ML) was used, which is a common method for analyzing normally distributed data with conventional standard errors and chi-square statistic. To evaluate goodness of the model fit, the model chi-square (χ) test statistic and

other fit indices were considered simultaneously. Specific types of the fit indices and their cutoff levels for determining goodness of the model fit include: NFI ($\geq$ .95), TLI ($\geq$ .95), CFI ($\geq$ .95), and RMSEA ($<$ .06 to .08 with confidence interval) (Hu & Bentler, 1999; Schreiber et al., 2006). Also, AIC and BIC values (the smaller the better) were compared between non-nested models (Kline, 2016).

To estimate the relations among the proposed latent variables in the SEM model, aggregate-level indicators, also referred to as *parcels*, were used. Each aggregate-level indicator was comprised of the average of items within the corresponding subscale. Compared to using item-level indicators, parceling suited this study better because it focused primarily on examining the relations among constructs (i.e., latent variables) rather than those among individual items. Also, the use of parceled data was appropriate to test a model that has a relatively small sample size because parcels need fewer estimated parameters to define a construct and therefore minimize residual error covariances (Little, Cunningham, Shahar, & Widaman, 2001).

In order to control for the interrelations among individual participants' responses to the identical survey items at Time 1 and Time 2, the hypothesized model included error (residual) covariances between the same constructs and variables that were measured at both time points. As a result of SEM analysis, standardized and unstandardized path coefficients, standard errors, and direct, indirect, and total effects among constructs and variables were estimated. To be able to draw valid conclusions from the SEM analysis, potential violations of important data assumptions were checked, such as linearity and

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normality among the measured variables, independence of sampling, and homoscedasticity of standardized residuals.

Additionally, multigroup SEM analysis was conducted to test for structural invariance between ethnic or racial minority (including African-American and Hispanic/Latinx) and non-minority student groups. The test involved comparing the model fits between the constrained model and the model without equality constraints (Kline, 2016). That is, structural equality constraints were imposed on the corresponding parameter estimates across groups, and then the model fits between the constrained model and the model without equality constraints were compared to detect any significant group difference. If the chi-square difference test results indicated that the fit of the constrained model was not significantly worse than that of the unrestricted model, this would suggest that there is structural invariance, or no significant group difference in the corresponding structural path. Also, the multigroup variables were binary coded (i.e., ethnic/racial minority versus non-minority) due to the limited sample size.

RESULTS

Prior to running the structural model, a measurement model (i.e., CFA) was tested to examine the reliability of observed variables as well as factor loadings of observed indicators and unique variances for the two key latent constructs, sense of classroom belonging and academic engagement. During the initial CFA analysis, model modification tests were also conducted to calculate modification indices and determine whether certain parameter needed to be added or subtracted to the final measurement model. The originally

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proposed model was respecified and analyzed only if the modification indices were greater than the critical value 3.84, which would significantly improve the model fit, and the given paths were theoretically plausible (Schreiber et al., 2006). As a result, a total of five error covariances between measurement variables were added to the model, including: relatedness to teacher with relatedness to classmates (both came from the same measurement tool) at each time point, connected classroom climate with emotional engagement at Time 1, behavioral engagement with cognitive engagement at each time point, relatedness with teacher with connected classroom climate at Time 2.

Figure 4 shows the estimated factor loadings from the final CFA model results. For each construct, factor loadings were significant and ranged from .50 to .98, suggesting that the proposed measures explained corresponding constructs at medium to high levels. Once the final CFA was validated, SEM analysis revealed that the model chi-square (χ^2) test statistic was significant, χ^2 (107) = 228.391 at $p < .001$. However, because the model χ^2 test statistic is sensitive to sample size, other fit indices were simultaneously considered to evaluate goodness of fit. All other fit indices fell into acceptable criteria (Schreiber et al., 2006), indicating that the hypothesized model fit the data fairly well: CFI = 0.965, SRMR = 0.042, and RMSEA = 0.062 (90% CI: .051, .073). Figure 5 shows the tested SEM model results, including values of significant standardized parameter estimates.

Figure 4:   Estimated Factor Loadings from the Final CFA Model[8]
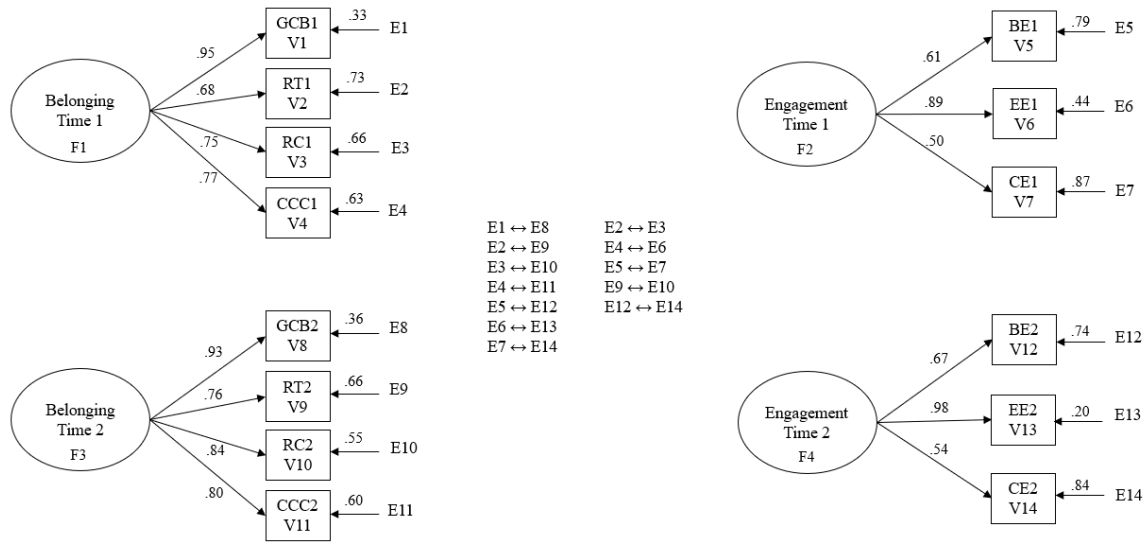
Figure 5:   Tested SEM Model with Standardized Parameter Estimates[9]

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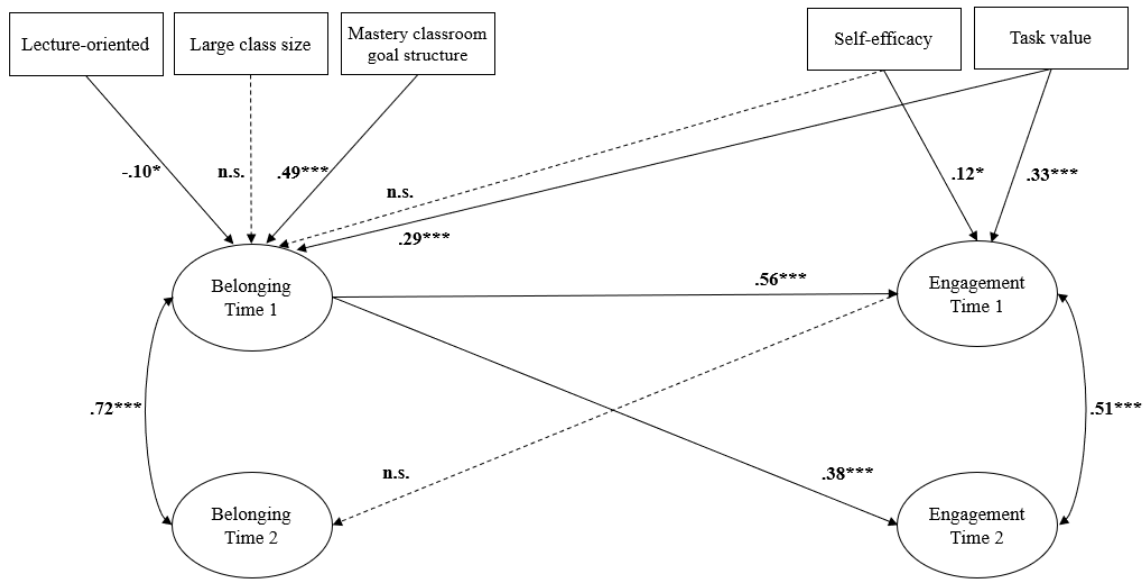
[8] Note that residual arrows and covariances between indicators were not included for the purpose of simplification.

[9] The covariance parameters between the same variables that were measured both at Time 1 and Time 2 were included in the model. Note that residual arrows and covariances between indicators were not included for the purpose of simplification.

In terms of the first research question, three hypotheses were tested to examine the relation between sense of classroom belonging and academic engagement in class. As shown in Figure 5, results confirmed *Hypothesis 1a* that participants' sense of classroom belonging at Time 1 (i.e., BELONG1) was significantly predictive of greater academic engagement at Time 1 (i.e., ENGAGE1; $\beta = .56$, p < .001), holding constant the effects of participants' self-efficacy and task value toward the course. Results also supported *Hypothesis 1b* as BELONG1 positively predicted engagement at Time 2 (i.e., ENGAGE2) when controlling for ENGAGE1 ($\beta = .38$, $p < .001$). Specifically, there was a .38 standard deviation (s.d.) unit increase in engagement over the semester as belonging increased by one s.d. at the semester mid-point.

Finally, results revealed that there was no indirect effect of BELONG1 on belonging at Time 2 (BELONG2) through ENGAGE1 ($p > .05$), suggesting that ENGAGE1 did not mediate between BELONG1 and BELONG2, and therefore *Hypothesis 1c* was rejected. Moreover, the path from ENGAGE1 to BELONG2 was not statistically significant, indicating that participants' levels of engagement in classroom tasks did not significantly affect their sense of classroom belonging toward the end of semester. Additionally, results showed that even when the effects of course attributes were considered in the model, participants' task value still positively predicted BELONG1 ($\beta = .29$, $p < .001$), suggesting that participants who perceived the course as important to their academic career tended to identify with the norms and practices of the class.

For the second research question, which addressed the potential effects of course attribute variables on sense of classroom belonging as well as on academic engagement,

two hypotheses were tested. First, regarding *Hypothesis 2a*, I tested whether the proposed course attributes significantly predicted BELONG1 and indirectly predicted BELONG2. Results indicated that traditional lecture-oriented instruction mode had a negative direct effect ($\beta = -.10$, $p < .05$), whereas mastery classroom goal structure had a positive direct effect on BELONG1 ($\beta = .49$, $p < .001$). In contrast, there was no significant direct effect of large class size (60 or more students) on BELONG1. Even when using an alternative measure of class size that takes 25 students as the cutoff point (Cuseo, 2007), class size still did not significantly predict BELONG1. In addition, results showed that none of the three course attribute variables had an indirect effect on BELONG2 through ENGAGE1.

Next, *Hypothesis 2b* tested the indirect effects of course attributes on ENGAGE1 and ENGAGE2. Results revealed that both instruction mode and classroom goal structure had indirect effects on academic engagement at both time points, mediated by BELONG1. In other words, such course attributes could serve as antecedents of participants' sense of classroom belonging at the beginning of the semester, which subsequently influenced their levels of engagement in classroom learning. Specifically, a lecture-oriented classroom structure had an indirect negative effect on ENGAGE1 and ENGAGE2, each through BELONG1. By contrast, mastery classroom goal structure had an indirect positive effect on both ENGAGE1 and ENGAGE2 that was mediated by BELONG1 (see Table 9). However, large class size did not have an indirect effect on either ENGAGE1 or ENGAGE2.

Table 9:   Standardized Indirect Effects Decompositions of the Structural Model[10]

Path	Indirect Effect	S.E.
Lecture-oriented mode → Belonging at Time 1 → Engagement at Time 1	-.05*	.02
Mastery-oriented classroom goal structure → Belonging at Time 1→ Engagement at Time 1	.27***	.03
Lecture-oriented mode → Belonging at Time 1 → Engagement at Time 2	-.04*	.02
Mastery-oriented classroom goal structure → Belonging at Time 1→ Engagement at Time 2	.19***	.04

The third research question examined the extent to which the hypothesized SEM model would apply to participants who were from ethnic/racial minority groups, that is, those from African-American and Hispanic/Latinx origins, and those from non-minority groups. Before conducting the multigroup SEM analysis, the mean scores on the sense of classroom belonging and academic engagement measures were compared between the ethnic minority and non-minority group (Figure 6). Results from t-tests did not reveal any statistically significant group differences. Then, multigroup SEM was performed to test a group difference in terms of the effect of participants' sense of classroom belonging on academic engagement over the semester.

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[10] Significant paths only. *$p < .05$. ***$p < .001$.

Figure 6: Comparison of Mean Scores between Ethnic Minority and Non-Minority Group[11]
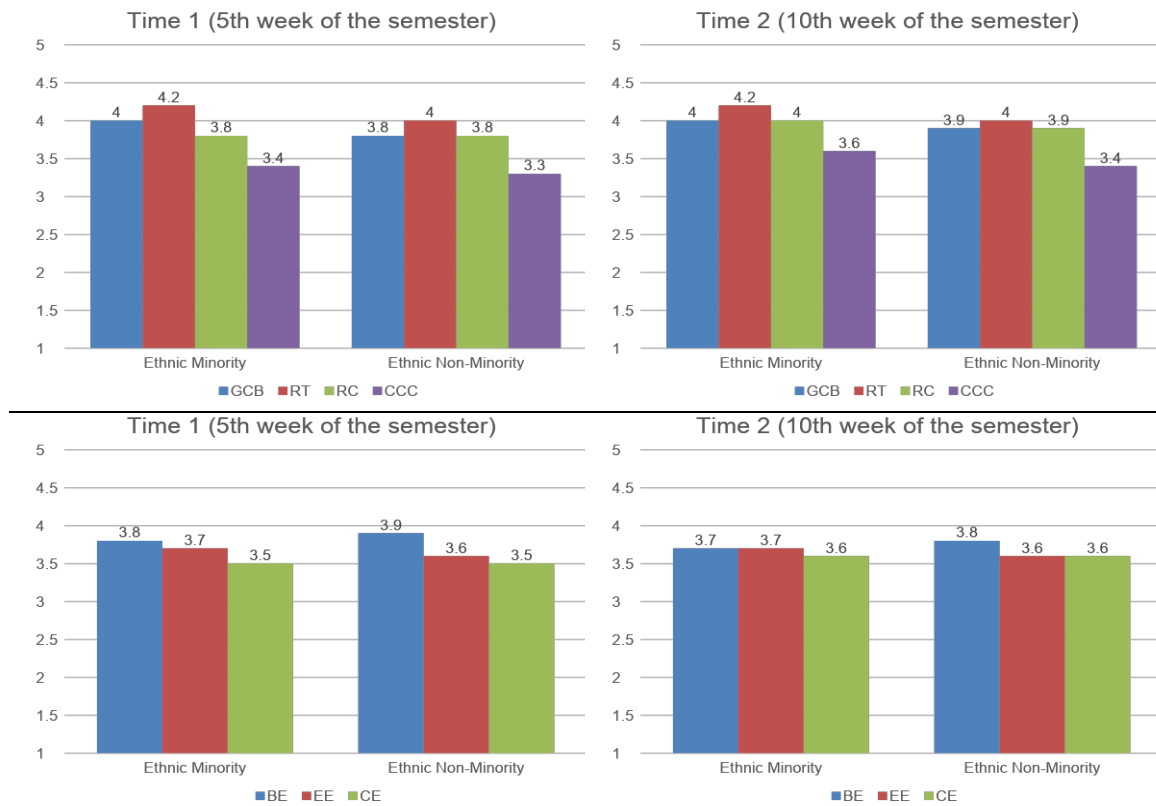
As shown in Table 10, the model fits between structurally unconstrained and constrained models were compared by conducting chi-square different tests. For example, when comparing between the fully constrained factor loadings model and the unconstrained/baseline model, there was a significant loss in fit ($\Delta\chi^2 = 11.084$, $\Delta df = 5$, $p < .05$), which resulted in the need to release the parameter from BELONG1 to RT1 (i.e., relatedness to teacher at Time 1). When the partial metric model in which the given

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[11] For the measures of sense of classroom belonging, GCB indicates general classroom belonging; RT relatedness to teacher; RC relatedness to classmates; and CCC connected classroom climate scale. In terms of academic engagement measures, BE indicates behavioral engagement; EE emotional engagement; and CE cognitive engagement scale.

parameter was released was compared to the fully constrained intercepts model, there was again a significant loss in fit ($\Delta\chi^2 = 20.049$, $\Delta df = 7$, $p < .01$). As a result, the intercept for RT1 was released in the subsequent partial strong model, and there was no longer a significant loss of fit from the fully constrained structural model, indicating that there was structural invariance between the two models.

Table 10:   Model Fit from Multigroup SEM Analysis

Model	χ^2	df	p-value	CFI	TLI	RMSEA (90% CI)	SRMR
Unconstrained// Baseline Model	114.930	76	.003	.970	.956	.059 (.035, .080)	.041
Fully Constrained Factor Loadings *(There was a significant loss in fit over the unconstrained model. p < .05)*	126.014	81	.001	.966	.952	.061 (.039, .082)	.056
Partial Metric *(BELONG1 BY RT1 was released.)*	115.481	80	.006	.973	.962	.055 (.030, .076)	.042
Fully Constrained Intercepts *(There was a significant loss in fit over the unconstrained model. p < .01)*	135.530	87	.001	.963	.952	.061 (.040, .081)	.061
Partial Strong *([RT1] was released.)*	122.879	86	.006	.972	.963	.054 (.030, .074)	.044
Fully Constrained Structural	128.073	97	.019	.976	.973	.047 (.020, .067)	.047

Overall, results from the multigroup SEM analysis suggested that the proposed theoretical and measurement models held across ethnic or racial minority and non-minority groups (see Figure 7). Results also indicated that the effect of BELONG1 on both ENGAGE1 and ENGAGE2 was equally significant for both groups. However, data analysis identified statistically significant differences between the two demographic groups

in terms of their perceived relatedness to their teacher at around the beginning of the semester (i.e., Time 1, or the one-third time point of the semester). Specifically, with a one s.d. increase in sense of classroom belonging, relatedness to teacher increased by .730 for non-minority students, which was significantly higher than for minority students (.566). Also, the intercept associated with relatedness to teacher was also higher for non-minority students. Nevertheless, results in general yielded construct-level evidence supporting the positive effect of sense of classroom belonging on academic engagement across the semester for not only non-minority students but also for ethnic/racial minority college students.

Figure 7:   Standardized Model Results from Multigroup SEM Analysis[12]

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STANDARDIZED MODEL RESULTS


STDYX Standardization

                                                      Two-Tailed
                        Estimate      S.E.   Est./S.E.   P-Value

Group G1

 BELONG1   BY
    Y1                    0.944      0.025     37.851     0.000
    Y2                    0.566      0.072      7.889     0.000
    Y3                    0.731      0.040     18.197     0.000
    Y4                    0.772      0.038     20.569     0.000

 ENGAGE2   BY
    Y12                   0.505      0.068      7.419     0.000
    Y13                   0.923      0.072     12.787     0.000
    Y14                   0.500      0.061      8.255     0.000

 ENGAGE2   ON
    BELONG1               0.397      0.068      5.858     0.000

 ENGAGE2   ON
    X4                    0.056      0.054      1.036     0.300
    X5                    0.341      0.068      5.024     0.000

 BELONG1   ON
    X1                   -0.095      0.048     -1.989     0.047
    X2                   -0.036      0.049     -0.744     0.457
    X3                    0.497      0.053      9.429     0.000
    X4                    0.067      0.050      1.323     0.186
    X5                    0.304      0.055      5.490     0.000

 Y2        WITH
    Y3                    0.269      0.068      3.931     0.000

 Y12       WITH
    Y13                   0.494      0.191      2.588     0.010
    Y14                   0.476      0.052      9.087     0.000

 Intercepts
    Y1                    2.147      0.396      5.427     0.000
    Y2                    5.762      0.779      7.395     0.000
    Y3                    2.014      0.369      5.464     0.000
    Y4                    1.180      0.348      3.394     0.001
    Y12                   2.969      0.375      7.914     0.000
    Y13                   0.925      0.322      2.873     0.004
    Y14                   2.979      0.364      8.173     0.000
    BELONG1               0.000      0.000    999.000   999.000
    ENGAGE2               0.000      0.000    999.000   999.000

 Residual Variances
    Y1                    0.108      0.047      2.300     0.021
    Y2                    0.680      0.081      8.366     0.000
    Y3                    0.466      0.059      7.934     0.000
    Y4                    0.404      0.058      6.957     0.000
    Y12                   0.745      0.069     10.850     0.000
    Y13                   0.148      0.133      1.110     0.267
    Y14                   0.750      0.060     12.413     0.000
    BELONG1               0.456      0.066      6.860     0.000
    ENGAGE2               0.545      0.096      5.678     0.000
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[12] Group 1 indicates Ethnic or Racial Minority group; and Group 2 indicates Non-Minority group.

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Figure 7, cont.

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Group G2

  BELONG1   BY
    Y1                    0.944      0.017     57.181      0.000
    Y2                    0.730      0.035     20.880      0.000
    Y3                    0.757      0.030     24.941      0.000
    Y4                    0.783      0.028     27.823      0.000

  ENGAGE2   BY
    Y12                   0.528      0.063      8.420      0.000
    Y13                   0.933      0.055     16.817      0.000
    Y14                   0.553      0.054     10.307      0.000

  ENGAGE2   ON
    BELONG1               0.407      0.063      6.507      0.000

  ENGAGE2   ON
    X4                    0.057      0.055      1.042      0.297
    X5                    0.322      0.061      5.313      0.000

  BELONG1   ON
    X1                   -0.088      0.044     -2.001      0.045
    X2                   -0.030      0.041     -0.744      0.457
    X3                    0.500      0.046     10.838      0.000
    X4                    0.066      0.050      1.328      0.184
    X5                    0.280      0.049      5.668      0.000

  Y2        WITH
    Y3                    0.237      0.059      4.019      0.000

  Y12       WITH
    Y13                   0.505      0.169      2.990      0.003
    Y14                   0.518      0.047     11.125      0.000

  Intercepts
    Y1                    1.971      0.355      5.554      0.000
    Y2                    2.928      0.412      7.105      0.000
    Y3                    1.914      0.348      5.502      0.000
    Y4                    1.099      0.323      3.408      0.001
    Y12                   2.929      0.364      8.051      0.000
    Y13                   0.882      0.306      2.881      0.004
    Y14                   3.110      0.376      8.279      0.000
    BELONG1               0.000      0.000    999.000    999.000
    ENGAGE2               0.000      0.000    999.000    999.000

  Residual Variances
    Y1                    0.109      0.031      3.498      0.000
    Y2                    0.467      0.051      9.131      0.000
    Y3                    0.428      0.046      9.315      0.000
    Y4                    0.386      0.044      8.755      0.000
    Y12                   0.721      0.066     10.882      0.000
    Y13                   0.129      0.104      1.248      0.212
    Y14                   0.694      0.059     11.680      0.000
    BELONG1               0.490      0.049      9.953      0.000
    ENGAGE2               0.561      0.071      7.893      0.000
```

Finally, as a supplementary analysis, I present highlights from participants' responses to three open-ended questions at the end of the second wave survey. The purpose of these questions was not only to capture participants' actual voices regarding their perceptions about belonging, but also to explore the extent to which they agreed with or endorsed the positive link between different sources of belonging (i.e., general feelings of belonging, levels of interactions with classmates and teacher) and their perceived levels of classroom participation and engagement in their courses. Participants' comments typically consisted of one or two sentences explaining why they either endorsed or disagreed with the given statement. Every comment was first coded for whether they endorsed or disagreed with the statement. As a second step, all comments endorsing support for the positive influence of sense of belonging on classroom engagement were further analyzed to identify common themes. As a result, a total of four general themes emerged: feeling comfortable or safe, feeling accepted or welcomed, having a desire to contribute or talk, and receiving support for learning course content. Table 11 provides a descriptive overview of responses to each of the three questions from ethnic/racial minority and non-minority groups. Null responses or responses that were irrelevant to the questions were excluded. Sample comments that correspond to each coding theme are shown in Table 12.

Table 11:   Frequency and Percentage of Themes from Participants' Responses to
Open-Ended Questions by Their Ethnic or Racial Minority Status

Question 1: Do you think that the degree to which you felt you belonged to this class influenced your class participation and engagement?			
	Ethnic/Racial Minority Group	Non-Minority Group	Total Groups
Endorsed # (%)	**58 (75%)**	**123 (64%)**	**181 (67%)**
Comfort/safety # (%)	17 (23%)	28 (20%)	45 (21%)
Feeling accepted # (%)	21 (28%)	30 (21%)	51 (24%)
Desire to contribute # (%)	30 (41%)	63 (45%)	93 (43%)
Support for learning # (%)	6 (8%)	19 (14%)	25 (12%)
Total # of mentions from Endorsed group #[13] (%)	74 (100%)	140 (100%)	214(100%)
Disagreed # (%)	**19 (25%)**	**69 (36%)**	**88 (33%)**
Total # of respondents (%)	**77 (100%)**	**192 (100%)**	**269 (100%)**

Question 2: Do you think that the level of interactions you had with classmates affected your class participation and engagement?			
	Ethnic/Racial Minority Group	Non-Minority Group	Total Groups
Endorsed # (%)	**55 (75%)**	**130 (64%)**	**185 (67%)**
Comfort/safety # (%)	12 (18%)	37 (24%)	49 (22%)
Feeling accepted # (%)	16 (25%)	19 (12%)	35 (16%)
Desire to contribute # (%)	19 (29%)	55 (35%)	74 (34%)
Support for learning # (%)	18 (28%)	44 (28%)	62 (28%)
Total # of mentions from Endorsed group # (%)	65 (100%)	155 (100%)	220 (100%)
Disagreed # (%)	**18 (25%)**	**64 (36%)**	**82 (33%)**
Total # of respondents (%)	**73 (100%)**	**194 (100%)**	**267 (100%)**

Question 3: Do you think that the level of interactions you had with the teacher affected your class participation and engagement?			
	Ethnic/Racial Minority Group	Non-Minority Group	Total Groups
Endorsed # (%)	**52 (70%)**	**141 (71%)**	**193 (71%)**
Comfort/safety # (%)	16 (19%)	33 (16%)	49 (17%)
Feeling accepted # (%)	27 (32%)	49 (24%)	76 (27%)
Desire to contribute # (%)	22 (26%)	59 (29%)	81 (28%)
Support for learning # (%)	20 (24%)	60 (30%)	80 (28%)
Total # of mentions from Endorsed group # (%)	85 (100%)	201(100%)	286 (100%)
Disagreed # (%)	**22 (30%)**	**58 (29%)**	**80 (29%)**
Total # of respondents (%)	**74 (100%)**	**141 (100%)**	**273 (100%)**

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[13] Total number of mentions indicates the aggregated frequency of the four themes that emerged from individual endorsing comments. Individual comments varied in terms of the number of themes that were mentioned; for example, some comments mentioned more than one theme.

Table 12:   Sample Comments from Open-Ended Responses

Question 1: General Sense of Belonging	Ethnic/Racial Minority Group	Non-Minority Group
Endorsed		
Comfort/safety	*Yes. I feel comfortable in class, which makes me feel more compelled to participate* *... because I felt a sense of belonging allowed me to be confident and not be afraid to ask questions.*	*Yes, because if there is a sense of belonging then you are able to feel more comfortable to participate and engage.* *Yes, you tend to speak up more when you feel safe.*
Feeling accepted	*Yes. Every student's opinion is greatly acknowledged, so every student is willing and excited to provide input.* *Yes. If I were to not have felt welcomed I would have not wanted to participate in the discussions or take a part of the conversations in class.*	*Yes. I usually do not like to participate in class discussions because I feel like I will be judged for what I say in the class.* *Absolutely. When I feel like an appreciated member in any class or group, I do better and engage more.*
Desire to contribute	*Yes because if you don't feel like you belong, you won't speak up and express your opinion.* *I am usually a quiet person, but in this class i am ... more willing to participate in class discussions.*	*Yes, it creates a space where I feel like I can contribute* *Yes I am more willing to share because my voice is heard. People want to hear what I have to say and the open dialogue creates a fun and engaging class.*
Support for learning	*Everyone is supportive and we have created some study groups to better comprehend the material.*	*Yes. ... there is a level of community that has developed. We ask each other questions about the material.*
Disagreed	*the most important factor to my class participation is based on my interest in the particular class and not necessarily how belonged I feel.*	*Not really. I work hard in all of my classes even when I feel detached or not included.*

Question 2: Interaction with Classmates	Ethnic/Racial Minority Group	Non-Minority Group
Endorsed		
Comfort/safety	*Yes, the more I interacted with my classmates, the more comfortable I got talking in front of them.* *Yes, I think that as I got to know my group members better, I was able to express my opinions more freely in my small group, and then due to their reactions I was able to contribute to class discussions with more confidence.*	*Yes, because the more that I interacted with individuals who were also in the class, the more I felt comfortable speaking up in class ...* *Yes. I do not interact with my classmates because I do not have the opportunity to, so I don't feel very comfortable participating the incredibly few times she even offers a chance to participate..*

Table 12, cont.

	Yes, because it makes interaction more welcomed. Yes knowing that I have had interactions with most people and them being nice makes it easier as I don't feel judged.	Yes, when I interact more with my classmates, I speak up more because I have validation for my ideas. Yes. Interacting with my classmates allows me to see that we are not so different from one another. After this realization, I feel that we are all able to communicate with each other more candidly.
Feeling accepted		
Desire to contribute	*Yes, when i had good interactions with classmates i wanted to participate more* *I feel that I can share my thoughts with them and vise versa resulting in frequent engagement.*	*Yes, it is easier to participate and engage if you have interacted with your classmates before. It makes it easier to talk to them* *Yes. The more I got to know the people in the class the more I wanted to come to class and engage in group activities with them …*
Support for learning	*Yes, when it comes to study groups it is helpful* *my interaction with classmates positively impacted my participation because we would discuss the material whenever we were told to. Introducing ourselves in the beginning of the semester helped to establish mutual connections and respect which propagated engagement.*	*Yes, interacting with other classmates makes smaller group discussions easier.* *Yes. The interactions my classmates and I had were around the course material, so I felt as if the amount of discussion directly influenced my participation.*
Disagreed	*No, I am interested in the class and the interactions with classmates does not increase or decrease my engagement*	*Not really. I engage no matter what. Like I said, I do it to learn.*

Question 3: Interaction with Teacher	Ethnic/Racial Minority Group	Non-Minority Group
Endorsed		
Comfort/safety	*For sure, it makes it easier to learn and a safe environment to ask questions* *Yes, having friendly interactions with my teacher makes it easier to participate because it helps me feel more relaxed in the classroom.*	*Yes, by getting to know my teacher, I feel more comfortable to participate in class.* *… If maybe I had the opportunity to interact with my professor more I would feel better and more confident in speaking out in class and being more engaged in class.*

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Table 12, cont.

Feeling accepted	*Yes, my professor in particular loves to hear what we have to say and it honestly feels like good knowing he is fully interested into what we have to say.* *My teacher has facilitated the judgement free environment in our classroom. My interactions with her have helped me to positively participate in class*	*Yes. I normally do not ever participate in class, but I have particiated in this class occasionally and I think that might be because my teacher … seems genuinely interested in what we have to contribute.* *Yes, I think personally knowing the teacher would increase understanding and mutual respect. Which would garner more participation and engagement.*
Desire to contribute	*I think that since I talked to my instructor one-on-one either after class and during office hours, I felt better about contributing to class discussions especially since she always tries to help us do better.* *The high level of interactions with my professor allowed me to feel more willing to participate and engage in the class through also feeling that my participation is being valued by my instructor.*	*Yes. My teacher is very open and encourages participation. I feel respected by him so I am willing to participate.* *Absolutely, as I have been called on more and more as the semester has progressed. Because of this, I know that the professor appreciates my input and that makes me want to contribute more to class discussions than I used to.*
Support for learning	*Yes because she helps me with the content and with the dates of assignments if I missed class* *Yes. I have had a few questions that I have had to ask my professor, and the way he responds to questions affects how much I participate and engage with the course material.*	*yes, I think because I have been called on before and spoken with the teacher outside of class that it has allowed me to become more invested and interested in the class.* *Yes. The teacher was very accepting and made me more inclined to engage in the course material. The friendlier she was, the more inclined I was to apply myself to the material.*
Disagreed	*No, I dont think this affected my participation. I do not interact with the teacher very much because i try to understand the material* *I do not think so. In another class, I have good interactions with the professor in office hours but I dont really talk in class.*	*I've spoken to my professor twice before class, but it didn't really affect my participation because I was interested in the topics.* *It's hard to really interact with the teacher in such a large class, so I don't really think this affects my engagement.*

Results showed that 75% of total comments from the ethnic/minority group and 64% of those from the non-minority group endorsed the statement that their class participation and engagement were influenced by (1) the degree to which they felt they belonged to their

class and (2) the level of interactions that they had with classmates. This finding suggests that ethnic/minority participants were more likely to perceive the beneficial effects of general sense of classroom belonging and relatedness with classmates, compared to their non-minority counterparts. By contrast, approximately the same proportions of comments from both groups endorsed the positive relation between interaction with teacher and engagement in classroom (non-minority group = 71%; minority group = 70%). Less than one-third of respondents from each group disagreed with the beneficial influence of sense of belonging. These respondents often mentioned that individual motivation or interest in course topics and class materials have stronger impacts on their participation and engagement.

In the ethnic/racial minority group, feeling a desire to contribute or share during class was the most frequently mentioned theme for explaining the effect of general sense of belonging (41%) and interaction with classmates (29%). Regarding the effect of interaction with teacher, feeling accepted or valued was most frequently mentioned by ethnic/racial minority participants (32%). In the non-minority group, feeling a desire to contribute was also the most frequently mentioned theme for general sense of belonging (45%) and interaction with classmates (35%). Non-minority participants mentioned the theme of receiving support for learning course materials most frequently regarding the effect of interaction with their teacher (30%). Between the two groups, there was a noticeable difference in terms of the proportions of comments that mentioned the theme of feeling accepted. Across the three questions, relatively higher proportions of ethnic/racial minority participants mentioned that having quality interactions with the teacher in class

promoted feelings of being accepted, valued or welcomed, compared to non-minority

participants.

Chapter 5: Discussion and Conclusion

In this chapter, I discuss interpretations of the analyses and results from my study with a focus on how the results are connected to existing literature both in a theoretical and empirical manner. Next, I discuss implications for theory and research, followed by implications for practice in teaching and learning. Finally, I conclude with limitations to this study and suggestions for future research.

DISCUSSION OF FINDINGS

My findings broadly contribute to extending the existing literature that has applied Deci and Ryan's (2002) self-determination theory to examining individuals' motivation in educational settings. Among the three fundamental human needs for optimal motivation, my study delved into the notion of relatedness (i.e., belongingness), which has received growing attention from researchers (Martin & Dowson, 2009; Wilson et al., 2015; Zumbrunn et al., 2014). In particular, adopting a longitudinal research design, my study examined the extent to which students' perceived belonging to their class would predict their academic engagement over the period of a semester.

Results generally supported previous research findings as they yielded statistically significant evidence supporting the positive relation between sense of belonging and engagement in college classroom (Freeman et al., 2007; Wilson et al., 2015; Zumbrunn et al., 2014). What my results added through the study's longitudinal design was evidence for the substantial role of sense of belonging in enhancing class engagement and participation

over time as shown by the significant prediction of academic engagement later in the semester from participants' sense of belonging in classroom at the beginning of the semester. Moreover, the tested model indicated that the relation between participants' sense of classroom belonging and academic engagement was still significantly strong, even after controlling for course attributes, participants' self-ratings of their ability to succeed in the course, and their perceived value of learning course materials.

Through a SEM approach, this study expands extant conceptualizations of the construct of sense of belonging in classroom situations. Recent research has quantitatively measured college students' sense of classroom belonging by using Goodenow's (1993) framework that posited sense of belonging in school as consisting of three components: general feelings of fitting in and social support from peers and teachers (e.g., Freeman et al., 2007; Zumbrunn et al., 2014). Likewise, tests indicated that my proposed model, which reflected Goodenow's conceptualization, fit the data well, suggesting the applicability of the theoretical framework to college classroom settings. In addition to the three component indicators, however, the SEM analysis also revealed that participants' sense of belonging could be shaped by the extent to which they perceived a connected and supportive communication environment within the classroom (Dwyer et al., 2004; Strayhorn, 2012). Therefore, the results suggest that both perceived relatedness to the classroom community and feelings of comfort in interacting with others are crucial factors that determine how much individual students feel as if they are an accepted and valued member of the course.

This study also adds theoretical richness to existing models of sense of classroom belonging by taking simultaneously into account different course attributes in the model.

Previous research has provided somewhat fragmented clues about the potentially negative impacts on students' feelings of connectedness or belonging of large class sizes (Finn, Pannozzo, & Achilles, 2003; Sidelinger & Booth-Butterfield, 2010) as well as of traditional lecture-based mode of instruction (Cuseo, 2007; Kim et al., 2017). My SEM analysis revealed that irrespective of sizes of the class, participants' sense of classroom belonging was negatively influenced by teachers' reliance on traditional lectures, and their decreased levels of belonging subsequently had a negative impact on their engagement in classroom learning.

The results also showed that in classrooms where the teacher adopted instruction practices associated with mastery-oriented goals, participants' sense of belonging increased, which in turn enhanced their academic engagement. This finding further deepens our understanding about the beneficial effect of mastery-oriented classroom goals (Anderman & Anderman, 1999; Meece et al., 2006). It suggests that when a teacher creates opportunities for students to seek improvement and mastery even at the beginning of the semester, students are likely to feel greater sense of belonging and maintain increased levels of persistence and effort in classroom learning over time. In sum, the results from my study inform research on the antecedents and consequences of students' sense of belonging over the semester, particularly in college classroom settings.

Additionally, the present study addressed the important question of for whom sense of belonging can be more beneficial. In particular, this study focused on ethnic or racial minority students who have been described as likely to feel isolated in large higher education institutions (Booker, 2007; Hurtado & Carter, 1997; Strayhorn, 2015). Results

from the multigroup SEM analysis revealed that the path coefficient from sense of classroom belonging to relatedness to teacher at the beginning of the semester was significantly smaller for participants from either African-American or Hispanic/Latinx origins than their non-minority counterparts. This finding suggests that for ethnic/racial minority participants, their perceptions about the general classroom climate and their interactions with classmates may be more crucial than their experience with teachers at the beginning of the semester. Nevertheless, the results generally indicated that the magnitude of the positive effect of sense of belonging on academic engagement was almost equal for both groups, holding constant their varying individual motivations and course environments. My study underscores the fundamental nature of students' need for belongingness and its influential role in promoting academic success across students from different ethnicities or races in the higher education context (Hausmann et al., 2007; Pascarella & Terenzini, 2005).

IMPLICATIONS FOR THEORY AND RESEARCH

Results of the test of fit of the SEM model revealed some interesting implications in regards to the relation between sense of belonging and engagement. Contrary to previous researchers' suggestions of a reciprocal relation between these two constructs (Furrer & Skinner, 2003), my findings indicated that college students' sense of belonging and academic engagement were not reciprocally related to each other over time. Instead, participants' academic engagement at the beginning of the semester did not significantly predict their sense of belonging at a later point in the semester. Additionally, academic

engagement did not mediate the relationship between participants' sense of belonging at the beginning and near the end of the semester, suggesting that in college classroom environments, the directionality of the association between sense of belonging and academic engagement is not reciprocal but flows from belonging to engagement rather than vice versa. To ensure causality in the suggested direction, however, further research is needed, perhaps in laboratory settings.

Next, interestingly, class size was the only attribute that did not have any significant predictive relations with either sense of belonging or academic engagement among participants. Even though large class sizes with 60 or more students had significantly negative correlations with students' general sense of classroom belonging ($r = -.13$ at Time 1 and $r = -.12$ at Time 2) and relatedness with teacher subscales at both time points ($r = -.15$ at Time 1 and $r = -.17$ at Time 2), the effect of large class sizes on the construct of sense of belonging was not statistically significant in the SEM model. This finding implies that a rather fixed physical attribute of a course such as class size might play a less influential role on shaping participants' perceptions of belonging, compared to other course attributes over which a teacher can exert some control. However, in order to understand better the role of class size in explaining college students' sense of classroom belonging, further research is needed to discern what exactly constitutes a large class size (i.e., there is lack of consensus in current theories regarding the threshold) and whether there exists a critical size that may affect students' perceptions and feelings.

Additionally, the supplemental analysis of common themes that emerged from participants' open-ended survey responses yielded patterns that are consistent with the

findings from multigroup SEM. For both ethnic/racial minority and non-minority groups, approximately two-thirds of respondents endorsed the beneficial effects of general belongingness to their class and having frequent quality interactions with classmates and the teacher on their classroom participation and engagement. Also, participants from both groups frequently mentioned that they felt encouraged to talk and contribute during class activities when they perceived greater sense of classroom belonging. However, interestingly, the endorsement rate was considerably higher in the ethnic/racial minority group than the non-minority group regarding the beneficial effects of their general sense of belonging and relatedness with classmates only. The use of more systematic qualitative research methods such as focus group and interview are warranted to elicit in-depth understanding about the complex experiences of ethnic or racial minority students in university campus as well as to explore new areas of research.

IMPLICATIONS FOR PRACTICE

The findings from this study provide useful implications for learning and teaching in college classroom settings. One notable finding in this regard is that larger class sizes does not significantly predict participants' sense of classroom belonging. This (non-)finding can be encouraging for teachers in that students' perceptions of belonging may not be driven merely by class size. Instead, my findings suggest that students' sense of classroom belonging seems related to other course attributes that are controllable by the teacher, such as structures of classroom goals and methods of instruction. Based on these findings, I would like to suggest several recommendations for teachers and practitioners

regarding the design and implementation of course activities and tasks. Given that my sample came from a higher education setting, the suggestions here could have particular relevance for faculty development in university settings.

First of all, a teacher's choice of instruction method and practices can significantly affect the development of students' perceptions of their classroom community even at the beginning of the semester. When the teacher chooses to use the traditional lecture-oriented mode of instruction, students are less likely to feel a sense of belonging or connectedness to their peer students and to the teacher in the classroom. Nevertheless, students may be able to experience a gradually increasing sense of belonging if they are situated in a course environment that nurtures active interactions among classroom members. In addition, students will benefit from teachers' adoption of mastery-oriented goals for learning, such as emphasizing the value of learning itself and appreciating efforts to make progress in mastering course content.

Furthermore, students' sense of classroom belonging early in the course semester can have a powerful impact on future classroom participation and engagement in learning. That is, students' initial feelings of being respected and accepted as valued members of the classroom can contribute not only to enhancing their academic engagement at the beginning of the semester but also to increased levels of engagement toward the end of the semester. Although students' individual motivation factors (e.g., self-efficacy, task value) are still considered as strong and immediate predictors of their academic engagement, educators in higher education should pay attention to the crucial role of students' sense of belonging in determining their behavioral, emotional, and cognitive engagement with

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classroom learning throughout the semester. Especially, it may be necessary for teachers to prioritize their strategies to create an inclusive and connected classroom climate when they are planning their lessons in a college course.

LIMITATIONS AND FUTURE RESEARCH

There were several limitations to this study, some of which can be addressed through future research. First, the generalizability of the findings may be limited due to the nature of the sample used. Participants in the study were recruited from only one institution, a flagship state university with highly selective admission in a southwestern city of the U.S. Although the sampled institution has a diverse student population, it may not represent the demographics and backgrounds of students in other types of institutions. Thus, future studies should examine whether the findings from this study hold for students from other types of institutions, such as small liberal arts colleges, private universities, and historically black institutions.

Another specific way in which the sample may be limited is that there were few participants identifying as African-American, only 4%. Although this corresponds to the racial distribution of the institution from which I collected data, this small percentage may make it difficult to find differences in the effect of sense of classroom belonging on engagement based on a group difference test. That is, I am unable to rule out the possibility that non-finding of difference is due to a severe underrepresentation of minorities in the sample. This also limits my study by hindering the examination of ethnic minorities in a fine-grained manner. Because there were very few ethnic minorities in the sample, in my

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analysis, I had to group them together, assigning African-American and Hispanic/Latinx students to the same group. Therefore, in future studies, it would be important to overcome this limitation by intentionally oversampling ethnic minority students from various groups to create a more equal distribution based on ethnicity. Alternatively, future studies may want to consider collecting samples from institutions in which there is a greater representation of these minority groups.

Second, in terms of research method, the present study tested the proposed SEM model by using aggregate scores of items (i.e., parceling) instead of individual item-level scores because of the relatively small sample size. The parceling technique may provide less nuanced information about how much individual items contribute to estimating the overall construct. Also, this study relied on the same self-report measures at two different time points, which leaves open the possibility of social desirability bias affecting participants' responses. Additionally, as the online survey was repeated, it is possible that participants' responses were affected to some degree by their memory of past responses rather than their current perceptions at the point being surveyed. Thus, future studies should use not only a larger sample size but also different sources of measurements such as classroom observations, teacher's ratings of students' efforts, and actual course grades.

Third, participants reported their perceptions in relation to only one of the courses they were taking, and they were directed to choose the course that was associated with educational psychology topics. Even though the collected data had some variance in course attributes as well as other key independent and dependent variables, it is still open to question whether the tested model would apply to courses in other areas of studies. Future

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research could therefore extend this study by capturing in its sample a more diverse range of course topics. In addition, it is still unclear to what extent individual students have varying perceptions toward different courses. Therefore, future research should examine the relations among course attributes, sense of belonging, and academic engagement at the intraindividual level. For example, researchers may ask participants to report their perceptions about more than one course in different topic areas at multiple time points.

Finally, there might be some interesting variance in students' perceptions and expectations about what constitutes lecture-orientation or large class sizes for which the current study may not fully account. As discussed above, the overall patterns observed in Tables 5 and 6 show that the survey measures of class size and instruction mode are capturing these variables. However, a more in-depth look at these tables does reveal some noteworthy variance in students' perceptions of these variables. For example, for Course 4 in Table 5 (with an average of 60 students enrolled), 59% of participants who reported taking that course characterized it as medium sized, whereas 23% determined it to be small and the remaining 18% characterized it as large. I also observed variance in perceptions about lecture mode as observed in Table 6. For instance, even when the choice of primary instruction mode was lecture-oriented, 39% of participants perceived that there was at least some amount of small-group work involved in the class. Indeed, this may be due to students' preconceived notions of what constitutes a large class or lecture-oriented mode of instruction based on their idiosyncratic experiences. Therefore, in future research, it would be interesting to examine to what degree there is actual agreement in perceptions of variables in a group of students who are taking the same course with the same instructor.

Another way to address this limitation would be to collect data on instructors' perceptions of their teaching method and class size.

CONCLUSION

My dissertation project was focused on exploring why college students' sense of belonging matters based on the perspective of current motivation theories. Particularly, I sought to understand the mechanisms through which sense of belonging affects students' effort and their energy in varying classroom settings. In the pilot study, I focused on conceptualizing what it means for students to feel belongingness in a classroom situation and on identifying key components of college students' sense of classroom belonging. Through SEM analyses, I found that sense of classroom belonging not only predicts engagement in class activities, but also mediates the effects of some course attributes on engagement. The results of the pilot study informed the research design and questions for the main study, which adopted a more advanced model that incorporated a longitudinal design and a more elaborated conception of academic engagement as well as course attributes.

Findings from the main study provides key insights about the powerful impact of feeling a sense of belonging in a college classroom environment. First, students' initial experience of belongingness to their classmates and teacher in a class can increase their persistence in pursuing learning over time. Second, sense of belonging may serve as an intervening variable that mediates the positive effect on academic engagement of a mastery-oriented classroom goal structure as well as instruction methods that involve

students in active interactions with classroom members. Finally, my findings showed that a sense of belonging generally matters for both ethnic or racial minority students and non-minority students. However, a more nuanced look at the data suggests that for students from ethnic or racial minority origins, it may be more important to nurture a supportive classroom climate and provide ample opportunities to connect with their peer students. It is my hope that these results will be useful in developing a better understanding of the dynamics of students' experience of classroom life and will serve to guide and support classroom practices that will help all students feel more at home in the college classroom.

Appendix: A List of Scales and Items

I. Demographic Information
Q1. What is your age? ___ 18-24 years old   ___ 25-34 years old   ___ 35 years or older
Q2. What is your gender? ___ Man   ___Woman   ___ Other
Q3. What is your race (or ethnicity origin)?
___ Asian / Pacific Islander   ___ Black / African American   ___ Hispanic or Latino
___ Native American or American Indian   ___ White / European American   ___ Other
Q4. What is your native language(s)?
___ English   ___ Spanish   ___ Chinese   ___ Other
Q5. What is the highest level of education completed by your parent(s)?
___ Did not complete High School   ___ High School/GED   ___ Some College
___ Bachelor's Degree   ___ Master's Degree   ___ Advanced Graduate work or PhD
___ Not Sure
Q6. What is your major?
___ Architecture ___ Business   ___ Communication   ___ Education   ___ Engineering
___ Fine Arts ___ Liberal Arts   ___ Natural Science   ___ Nursing   ___ Pharmacy
___ Social Work ___ Undeclared
Q7. What is your current GPA? ___ below 2.5   ___ 2.6-3.0   ___ 3.1-3.5   ___ 3.6-4.0
Q8. What is your class level? ___ Freshman __ Sophomore ___ Junior __ Senior ___ Other

II. General Need for Relatedness Scale
In this section, you are going to be asked about your general needs for relatedness. Please read each statement and rate the extent to which each statement is true of yourself.
(Each item have a 5-point Likert scale: __ Not at all   __Slightly   __Moderately   __Very __Completely)

[General Need for Relatedness]
Q14. I really like the people I interact with.
Q15. I get along with people I come into contact with.
Q16. I pretty much keep to myself and don't have a lot of social contacts. (R)
Q17. I consider the people I regularly interact with to be my friends.
Q18. People in my life care about me.
Q19. There are not many people that I am close to. (R)
Q20. The people I interact with regularly do not seem to like me much. (R)

III. Course Information
Q21 (Force response). Please choose the name of one course that you are currently taking this semester and that has an EDP subject pool requirement. In the following pages, you will be required to respond to survey items about this specific course. _____
EDP 304 STRATEGIC LEARNING FOR 21ST CENTURY
EDP 306 HUMAN SEXUALITY/RELATIONSHIPS

EDP 350E INTRODUCTION TO LIFE SPAN DEVELOPMENT
EDP 350G ADOLESCENT DEVELOPMENT
EDP 350L HUMAN SEXUALITY
EDP 371 INTRODUCTION TO STATISTICS

Q22. When do you have this class? (For example, Tuesdays 1-4pm) _____
Q23. Is this course required by your major? ___ Yes   ___ No
Q24. What is the one main reason for taking this course?
___ Because I am interested in the subject. ___ Because this class is required.   ___ Because it will be necessary for my future career.
Q25A. What is this course's dominant instruction style?
___ Lecture-oriented   ___ Discussion-oriented   ___ Small group activity-oriented
___ Mix of lecture and discussion   ___ Lab-oriented   ___ Other _____
Q25B. How often does this course involve you in small-group discussion or other group works?
___ Rarely   ___ Occasionally   ___ Somewhat often   ___ Often   ___ Very often
Q26A. How many students are in the classroom?
___ Over 100   ___ 60-100   ___ 26-59   ___ 10-25   ___ 10 or fewer
Q26B. How would you characterize the size of this class?
___ Small   ___ Medium   ___ Large
Q27. How many students are your friends or colleagues in the classroom? ____

[Classroom Goal Structure - Perceived Classroom Mastery Goal Structure]
Q33. My teacher points out those students who get good grades as an example to all of us.
Q34. My teacher lets us know who gets the highest scores on a test.
Q35. My teacher makes it obvious when certain students are not doing well on their work.
Q36. My teacher tells us how we compare with other students.
Q37. My teacher calls on smart students more than on other students.

IV. Sense of Classroom Belonging
[General Classroom Belongingness]
Q38. I feel like a real part of this class.
Q39. I am included in lots of activities at this class.
Q40. I am treated with as much respect as other students.
Q41. I can really be myself at this class.
Q42. People at this class are friendly to me.
Q43. It's hard for people like me to be accepted here (R).
Q44. Sometimes I feel as if I don't belong here (R).
Q45. I feel very different from most other students here (R).
Q46. I wish I were in a different class (R).
Q47. I feel proud of belonging to this class (R).

[Relatedness to Teacher and Classmates]
When I'm with my teacher,

Q48. I feel accepted.
Q49. I feel like someone special.
Q50. I feel ignored (R).
Q51. I feel unimportant. (R).
When I'm with my classmates,
Q52. I feel accepted.
Q53. I feel like someone special.
Q54. I feel ignored (R).
Q55. I feel unimportant. (R).

[Connected Classroom Climate Inventory]
Q56. I feel a sense of security in my class.
Q57. I have common ground with my classmates.
Q58. I feel a strong bond with my classmates.
Q59. The students in my class share stories and experiences with one another.
Q60. The students in my class are friendly with one another.
Q61. The students in my class respect one another.
Q62. I feel included in class discussions in my class.
Q63. The students in my class are courteous with one another.
Q64. The students in my class praise one another.
Q65. The students in my class are concerned about one another.
Q66. The students in my class smile at one another.
Q67. The students in my class engage in small talk with one another.
Q68. The students in my class are non-judgmental with one another.
Q69. The students in my class laugh with one another.
Q70. The students in my class are supportive of one another.
Q71. The students in my class show interest in what one another is saying.
Q72. The students in my class cooperate with one another.
Q73. The students in my class feel comfortable with one another.

V. Academic Motivation
[Self-Efficacy]
Q74. I believe I will receive an excellent grade in this class.
Q75. I'm confident I can understand the basic concepts taught in this course.
Q76. I'm confident I can understand the most complex material presented by the instructor in this course.
Q77. I'm certain I can master the skills being taught in this class.
Q78. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

[Task Value]
Q79. I think I will be able to use what I learn in this course in other courses.
Q80. It is important for me to learn the course material in this class.
Q81. I am very interested in the content area of this course.

Q82. I think the course material in this class is useful for me to learn.

Q83. Understanding the subject matter of this course is very important to me.

VI. Academic Engagement
[Behavioral Engagement]
Q84. I try hard to do well in school.

Q85. In class, I work as hard as I can.

Q86. When I'm in class, I participate in class discussions.

Q87. I pay attention in class.

Q88. When I'm in class, I listen very carefully.

[Emotional Engagement]
Q89. When I'm in class, I feel good.

Q90. When we work on something in class, I feel interested.

Q91. Class is fun.

Q92. I enjoy learning new things in class.

Q93. When we work on something in class, I get involved.

[Cognitive Engagement - Cognitive Strategy Use]
Q94. When I study I put important ideas into my own words.

Q95. I always try to understand what the teacher is saying even if it doesn't make sense.

Q96. When studying, I copy my notes over to help me remember material.

Q97. When I am studying a topic, I try to make everything fit together.

Q98. When I read material for this class, I say the words over and over to myself to help me remember.

Q99. When reading I try to connect the things I am reading about with what I already know.

[Cognitive Engagement - Self-Regulation]
Q100. I ask myself questions to make sure I know the material I have been studying.

Q101. Even when study materials are dull and uninteresting, I keep working until I finish.

Q102. Before I begin studying I think about the things I will need to do to learn.

Q103. I work hard to get a good grade even when I don't like a class.

VIII. Short-Answer Questions
Please briefly answer the following three open-ended questions about your perceptions of interpersonal relationships in this particular class.

Q104. Do you think that the degree to which you felt you belonged to this class influenced your class participation and engagement? Please briefly explain why.

Q105. Do you think that the level of interactions you had with classmates affected your class participation and engagement? Please briefly explain why.

Q106. Do you think that the level of interactions you had with the teacher affected your class participation and engagement? Please briefly explain why.

Note. (R) indicates reversed coding.

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